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TEST & EVALUATION COMMAND

USATECOM PROJECT NO. 4-3-0250-31/32/33

PART ONE OF TWO PARTS

REPORT
OF THE ENGINEERING FLIGHT TEST
STABILITY and CONTROL PHASE
OF THE
OH-5A HELICOPTER, UNARMED (CLEAN) and ARMED
WITH THE XM-7 or XM-8 WEAPON SUBSYSTEM

AUGUST 1964

HEADQUARTERS

U.S. ARMY AVIATION TEST ACTIVITY

EDWARDS AFB, CALIFORNIA

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U. S. ARMY AVIATION TEST ACTIVITY

~~PART~~ ONE OF TWO PARTS

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REPORT

OF THE ENGINEERING FLIGHT TEST

--STABILITY AND CONTROL PHASE--

OF THE

OH-5A HELICOPTER, UNARMED (CLEAN) AND ARMED WITH THE XM-7 OR XM-8 WEAPON SUBSYSTEM. Part I.

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DA [redacted]-1R141803D168

21 See also Part 2, AD-909 270L

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FOREWORD

Essential to an understanding of the results of aircraft testing is an understanding of the differences between engineering and service testing.

Engineering testing, using instrumented aircraft and calibrated instruments, can determine and record the exact performance, control response and limits, engine performance and power available, through accurate measurements and reduction of data to standard conditions. Thus, it is possible to determine when an aircraft is approaching or exceeding design limits or other specified criteria.

Service testing, using aircraft in standard configuration, results in a qualitative evaluation for user-type information. This information is based on a broad scope of pilot experience and technique provided by pilots ranging from those recently out of school to those with considerable field operational experience. The installed instruments and gauges are used to determine significant operating data. These instruments are not usually calibrated but represent typical instruments found in production helicopters. These instruments and gauges are verified for accuracy within acceptable tolerances but do not attain the precision provided by the calibrated equipment used for engineering testing.

The service test-pilot makes qualitative observations on only what he experiences during normal service flying. These observations are not correlated to such factors as the margin of control remaining or exact rates of control response. Exact measurements of such factors are necessarily the responsibility of the engineering test agency. Thus, service testing may show that the aircraft is suitable for performing a mission when, actually, flight has been performed close to, or within, control margins specified by military specifications. What may appear to be discrepancies between service and engineering test reports is actually the difference between qualitative and quantitative reporting.

The Light Observation Helicopter evaluation is the first combined aircraft engineering and service test program that has resulted in coordination of reports and comparison of reports prior to procurement decision. Caution must be exercised, therefore, to preclude taking an item out of context in any one report to establish a particular position. Seeming inconsistencies can be reconciled only by examination of all reports with due regard to the specific conditions under which the test was accomplished.

ABSTRACT

Stability and control tests were conducted on the OH-5A helicopter to determine stability and control characteristics throughout the flight envelope, specified in Federal Aviation Agency ~~Type Inspection Authorization~~ No. CH1204-4DM, 6 December 1963. In addition, XM-7 and XM-8 firing tests were conducted to define the aircraft's suitability for use as a weapons platform.

The U. S. Army Aviation Test Activity (USAATA), Edwards Air Force Base, California was designated Executive Test Agency for the confirmatory engineering tests in the LOH program and is responsible for test execution and test reporting of its assigned phase.

Engineering flight tests were conducted by the U. S. Army Aviation Test Activity at Edwards Air Force Base, California, and auxiliary test sites near Meadows Field, Bakersfield, California (sea level). A total of 62 test flights were conducted for 54.75 productive flight hours. The tests were accomplished between 20 April 1964 and 10 July 1964. Aircraft OH-5A, SN 62-4209 was used during the initial portion of the evaluation until it sustained a control structural failure in flight and was destroyed. The remainder of the program was conducted with aircraft OH-5A, SN 62-4210. The test helicopters were extensively instrumented to record all pertinent flight test data.

The OH-5A, in several important areas, failed to meet the flying qualities requirements of MIL-H-8501A. With an aft center-of-gravity (C.G.) loading in both clean (unarmed) and XM-8 armed configurations, the OH-5A was longitudinally control limited at high airspeeds in forward flight. The effective dihedral was weak in all configurations and on occasion, was neutral or slightly negative. A severe pitch-up was present at an aft C.G. in the clean configuration following an aft longitudinal control input. A severe tuck was present with the XM-7 installed at high airspeeds following a right pedal input. The pitch-up and tuck problems mentioned above are considered safety-of-flight problems and should be corrected prior to service acceptance of the OH-5A. Pedal forces were considered high and not in harmony with the cyclic control forces. No additional stability and control problems resulted during the firing of either the XM-7 or XM-8 armament system with the SAS "on."

Flight characteristics of the OH-5A with the SAS "off" were unsatisfactory. In moderate or heavier turbulence, it is questionable whether an average pilot could maintain control of the aircraft.

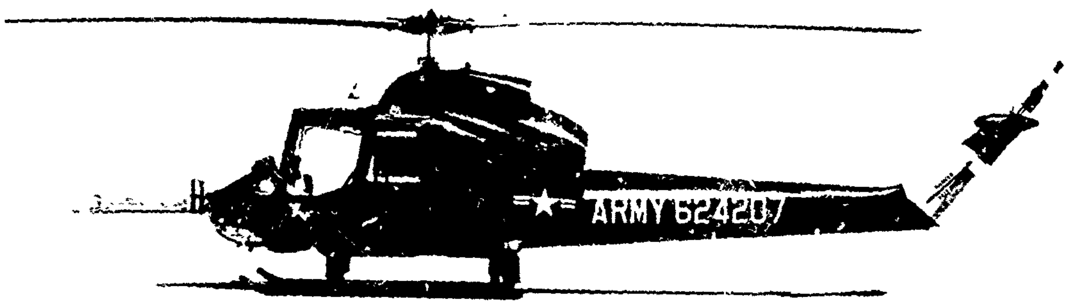

PHOTO 1 – OH-5A

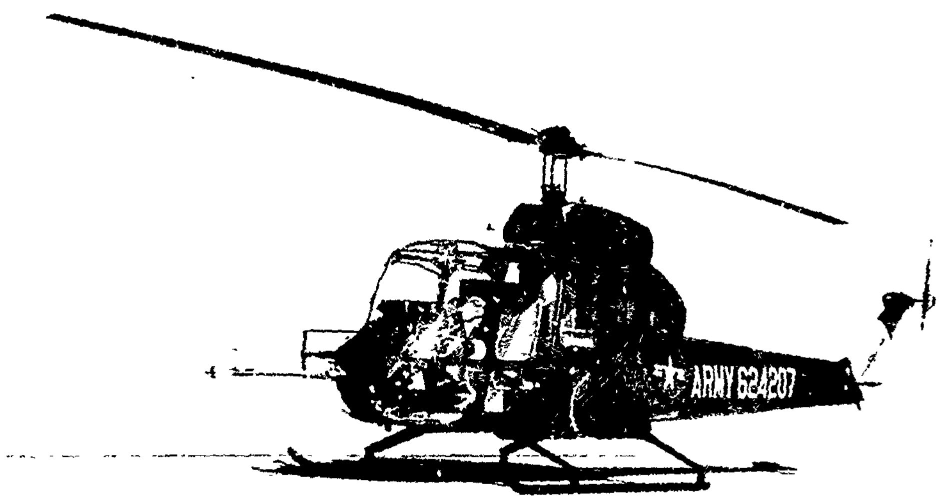

PHOTO 2 – OH-5A

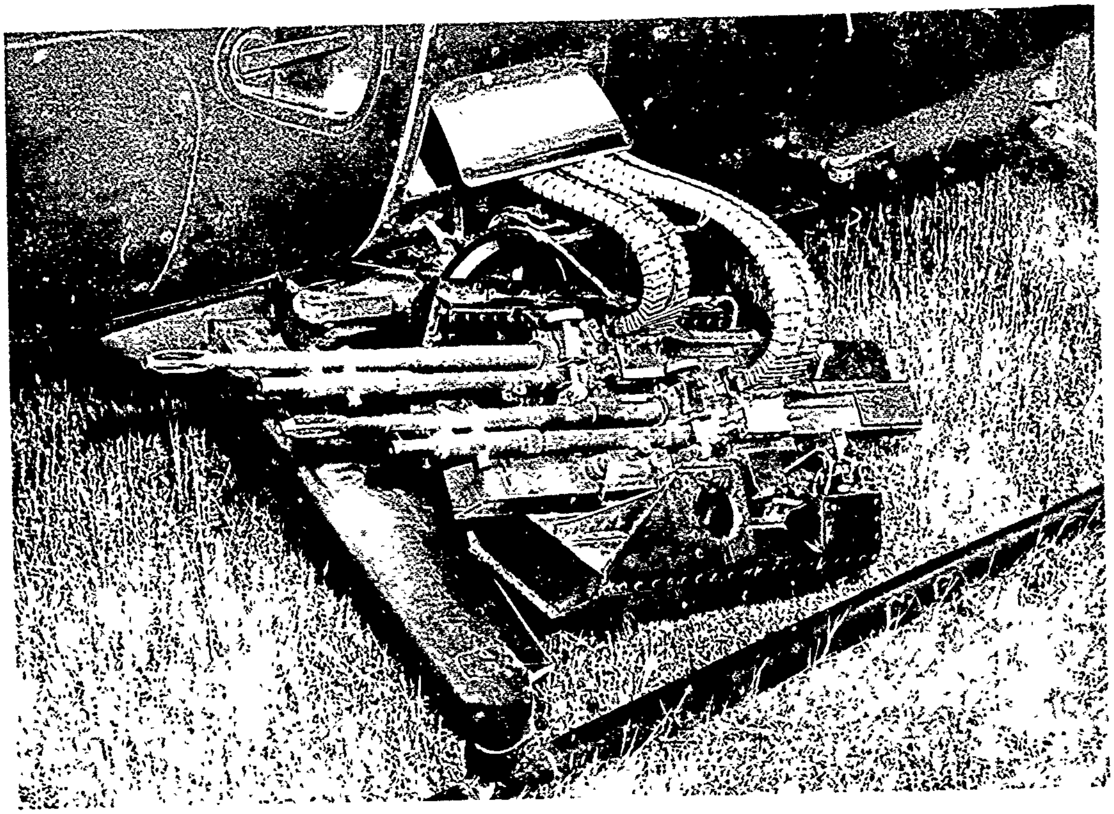

PHOTO 3 – XM-7 ARMAMENT KIT

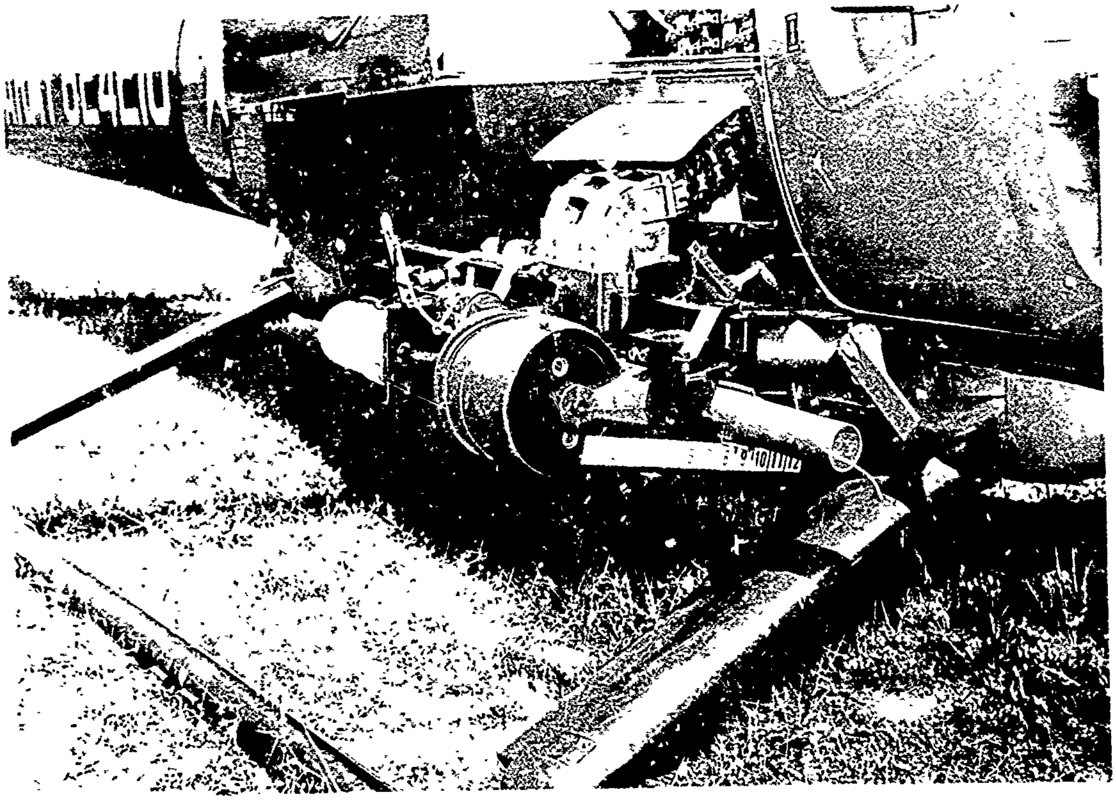

PHOTO 4 – XM-8 ARMAMENT KIT

SECTION 1 - GENERAL

1.1 REFERENCES

a. Military Characteristics, Light Observation Aircraft, TCTC Meeting 128, Item 3408, 20 May 1960.

b. Combat Development Objectives Guide (U) (CDOG), Paragraph 533a(1) as changed 25 March 1963.

c. Letter, AMCPM, Headquarters, U. S. Army Materiel Command, 12 March 1963, subject: "Test Directive, Evaluation of LOH," with 1 inclosure entitled "Test Directive for Flight Evaluation of OH-4/OH-5/OH-6 Aircraft."

d. Letter, AMSTE-BG, Headquarters, U. S. Army Test and Evaluation Command, 23 April 1963, subject: "Test Directive for Light Observation Helicopter."

e. Technical Development Plan, Project No. L-R-1-41803-D-168, "Light Observation Helicopter," U. S. Army Transportation Materiel Command, 20 February 1963.

f. Military Specification MIL-H-8501A, "General Requirements for Helicopter Flying and Ground Handling Qualities," 7 September 1961.

g. Federal Aviation Agency Type Inspection Authorization No. CH1204-4DM, 6 December 1963.

h. Final Report of "Engineering Test of the Stability and Control Characteristics of the OH-13H Equipped with the XM-1 Armament Kit," U. S. Army Aviation Test Activity, April 1964.

i. Coordinated Plan of Test, USATECOM Project No. 4-3-0250-31/32/33, "Military Potential Test of the Light Observation Helicopter (LOH), OH-4A, OH-5A, and OH-6A," U. S. Army Aviation Test Board, 17 September 1963.

j. Preliminary Technical Manual, "Organization Maintenance Manual, Army Model OH-5A Helicopters," TM55-1520-213-20, 20 April 1964.

k. "OH-5 Model Specification, Light Observation Helicopter," Hiller Aircraft Company, 15 September 1961.

l. Letter, SMOSM-PAIA-2, Headquarters, U. S. Army Aviation Materiel Command, 4 April 1964, subject: "Compliance Check of Manufacturer's Guaranteed Performance and Competitive Performance Evaluation."

1.2 AUTHORITY

Directive: Letter, AMSTE-BG, Headquarters, U. S. Army Test and Evaluation Command (USATECOM), 23 April 1963, subject: "Test Directive for Light Observation Helicopter".

1.3 OBJECTIVES

The objective of this program was to conduct engineering stability and control flight tests of the Light Observation Helicopter (LOH) Prototype OH-5A to (a) confirm contractor compliance with the approved Army Military Characteristics for an unarmed (clean) and armed OH-5A helicopter, using Military Specification MIL-H-8501A as a guide, and (b) provide data to assist in selecting an LOH design for possible future production.

1.4 RESPONSIBILITIES

The U. S. Army Aviation Test Activity (USAATA) was designated Executive Test Agency for the confirmatory engineering tests in the LOH program and is responsible for test execution and test reporting of its assigned program phase.

1.5 DESCRIPTION OF MATERIEL

a. Technical Characteristics

The OH-5A design incorporates a single main-rotor and anti-torque tail-rotor. The main rotor is a two-bladed teetering type which uses feathering of blades for cyclic control rather than a control rotor as on the OH-23D series helicopters. The main-rotor blades can be manually folded and unfolded. The cockpit provides side by side seating for a pilot and an observer. Temporary (stowable) side by side seating is provided in the rear (cargo) area for two passengers. The landing gear is of the skid type. A single rubberized fabric fuel cell having a capacity of 69 gallons is located within the fuselage between Stations 80 and 130. The OH-5A is powered by an Allison T63-A-5 gas turbine engine, rated for takeoff at 250 shaft horsepower (SHP) at an output shaft speed of 6000 revolutions per minute (rpm). The test aircraft flight controls consisted of dual anti-torque pedals, and a collective control stick and a cyclic control stick. The pilot's collective control stick incorporates the engine starter button. The pilot's cyclic stick grip incorporates switches for armament selection, firing, hover/landing lights, and intercom or radio selection.

The OH-5A incorporates a two-axis stability augmentation system (SAS). Pitch and roll motions are sensed by the gyro horizon and are translated into an electrical signal. This resultant signal is proportional to pitch and roll angle. The SAS converts this signal to one which will result in satisfactory helicopter stability and control characteristics. This converted signal is amplified

to provide power to drive the electric motors of the SAS actuators. The actuators are extendable links in the cyclic controls that are capable of moving the swashplate 15 percent of its travel longitudinally and 23 percent laterally. The SAS can be manually turned off by a switch located in the cockpit.

b. Physical Characteristics

The OH-5A has the following physical characteristics:

Rotor diameter	-	35 feet 5 inches
Overall length	-	39 feet 9 inches
Minimum width	-	7 feet 2.75 inches
Maximum height	-	11 feet 10.3 inches
Design gross weight	-	2530 pounds
Empty weight	-	1517 pounds
Overload gross weight	-	3000 pounds

c. OH-5A Armament

XM-7 and XM-8 armament kits were provided for testing with the OH-5A. Only one armament kit can be mounted on the OH-5A at a time. The tested XM-7 kit was mounted on the left side of the aircraft and the XM-8 was mounted on the right side. The tail incidence is set to 2 degrees nose-down without armament equipment and 6-1/2 degrees nose-down with armament equipment installed.

(1) XM-7 Armament Kit

The XM-7 is a light aircraft armament kit consisting of two M-60 7.62 mm machine guns that can be installed on the left side of the helicopter. The guns can be elevated to 14.6 degrees above or depressed 14.7 degrees below the helicopter waterline. The XM-7 system weight is 140 pounds, excluding the ammunition.

(2) XM-8 Armament Kit

The XM-8 is a light aircraft armament kit consisting of one XM-75 40 mm grenade launcher that is installed on the right side of the helicopter. The launcher can be elevated to 14.7 degrees or depressed to 19.8 degrees below the helicopter waterline. The XM-8 system weight is 142 pounds, excluding ammunition.

1.6 BACKGROUND

a. Requirement:

Paragraph 533a(1) of the Combat Development Objective Guide (CDOG), 25 March 1963 (reference b) and the approved Military Characteristics (MC's),(reference a) describe the light observation helicopter as follows: "The light observation aircraft shall be a lightweight, reliable, easily maintainable, readily air transportable helicopter capable of performing the following missions: visual observation and target acquisition, reconnaissance, and command control. The helicopter will be of minimum size consistent with the requirement for a pilot and three passengers, or a pilot and 400 pounds of cargo. Reliability and frontline supportability shall be given primary consideration."

b. General

(1) In October 1959, the Office of Chief, Research and Development, Department of the Army, initiated an Army Aircraft Development Plan to develop firm guidance for Army aviation for the period 1960-1970. As part of this plan, three Army Study Requirements (ASR's) describing broad development objectives in the area of light observation, manned surveillance, and tactical transport were prepared. The ASR's were presented to industry at Fort Monroe, Virginia, on 1 December 1959.

(2) As a result of the ASR 1-60 study on Army light observation aircraft, a decision was made to use light observation helicopters and to phase light observation aircraft out of Army inventory. The Light Observation Helicopter (LOH) Design Competition was initiated on 14 October 1960 by a letter to industry from the Bureau of Weapons, U. S. Navy. The designs were evaluated jointly by the U. S. Army and U. S. Navy, and three designs were selected for prototype testing. Army model designations for these helicopters are OH-4A, OH-5A and OH-6A.

(3) The contracts for "off-the-shelf" direct procurement were negotiated directly with the manufacturers. Contracts were awarded in November 1961 to each manufacturer for delivery of five protytype helicopters to be type certificated by the Federal Aviation Agency (FAA) in compliance with CAR, part 6. The Army had the option of accepting delivery before certification providing the FAA had issued Type Inspection Authorization (TIA).

1.7 FINDINGS

The OH-5A, in several important areas, failed to meet the flying qualities requirements of MIL-H-8501A.

Flight with the SAS "off" is hazardous, particularly in moderate or heavier turbulence and it is questionable whether under such conditions an average pilot could maintain control of the aircraft. This is particularly critical in the OH-5A because of the unreliability of the SAS system.

The OH-5A, at design gross weight (2530 pounds), and an aft C.G. (Station 101.4), in both the clean and XM-8 configurations, reaches the 10 percent remaining longitudinal control limit of MIL-H-8501A, paragraph 3.2.1 in forward flight at airspeeds (101 knots calibrated airspeed (KCAS) for the XM-8, 104 KCAS clean) lower than the TIA placard maximum for level flight (110 KCAS).

The OH-5A exhibited positive static longitudinal collective fixed stability in all configurations tested.

The OH-5A exhibited positive static directional stability in all configurations tested. Weak dihedral effect was observed in all configurations evaluated, and in several flight conditions it became neutral or negative (violates MIL-H-8501A, paragraph 3.3.9). An objectionable nose-down trim change occurred at high airspeeds with the XM-7 installed. This occurred during slight excursions from zero sideslip and gave the pilot a feeling of longitudinal instability when flying in this configuration at high airspeeds.

Sufficient control was available to fly faster than 30 knots sideward and 25 knots rearward in ground effect.

Excellent dynamic stability was exhibited by the OH-5A with the SAS "on."

Poor dynamic stability, with safety-of-flight implications, was observed with the SAS "off." The OH-5A was dynamically unstable about all axes. Complex coupling about the other two axes resulted from a disturbance about a single axis. A directional disturbance was particularly objectionable, with the initial period of the resulting oscillation approaching the pilot-aircraft reaction time, making conditions ideal for pilot-induced oscillations. These dynamic stability characteristics with the SAS "off" made flight in turbulence hazardous.

Controllability of the OH-5A was satisfactory and met the controllability criteria of MIL-H-8501A.

The following safety-of-flight implications were uncovered during the controllability evaluation with the SAS "on":

a. A severe pitch-up was encountered at the aft C.G. at higher airspeeds (violates MIL-H-8501A, paragraph 3.2.11.1). This was characterized by a sudden increase in pitch rate with the rate continuing to increase for nearly 1/2 second after corrective control was applied.

b. A severe tuck occurred following a pedal input with the XM-7 installed at airspeeds higher than $.8V_{MAX}$. There also was a tendency for this tuck to occur at a forward C.G. in the clean configuration, but in this case it was not nearly as severe.

No control problems were associated with autorotational entries. Poor engine response made power recoveries from an autorotation hazardous.

The characteristic of the control system with the SAS "on", whereby the longitudinal control stop moved relative to the cyclic control stick, was objectionable. Pedal forces were considered high during all flight conditions and not in harmony with the cyclic control forces.

No additional stability and control problems resulted when firing either the XM-7 or XM-8 armament system with the SAS "on."

The OH-5A exhibited static longitudinal and directional stability characteristics that were superior to the OH-13H and OH-23D. The effective dihedral exhibited by the OH-5A was weaker in all configurations tested than the OH-13H or OH-23D. The dynamic stability and controllability characteristics were superior with the SAS "on" and inferior with the SAS "off" to the OH-13H and OH-23D.

1.8 CONCLUSIONS. None

1.9 RECOMMENDATIONS. None

SECTION 2 - DETAILS AND RESULTS OF SUB-TESTS

2.0 INTRODUCTION

Stability and control tests were conducted on the OH-5A helicopter to determine its stability and control characteristics throughout the flight envelope specified in Federal Aviation Agency Type Inspection Authorization (FAA TIA) No. CH1204-4DM, 6 December 1963. In addition, XM-7 and XM-8 firing tests were conducted to check the aircraft's suitability for use as a weapons platform. Tests were conducted by the U. S. Army Aviation Test Activity at Edwards Air Force Base, California, and auxiliary test sites near Meadows Field, Bakersfield, California (sea level). A total of 62 test flights were conducted for 54.75 productive flight hours. The tests were accomplished between 20 April 1964 and 10 July 1964. Aircraft OH-5A, SN 62-4209, was used during the initial portion of the evaluation until it sustained a structural failure in flight and was destroyed. The remainder of the program was conducted with aircraft OH-5A, SN 62-4210.

All stability and control tests were conducted at a rotor rpm of 368 (100 percent N_2) at the following conditions unless otherwise specified:

Gross Weight	Density Altitude ~ Feet	Center of Gravity	Configuration
Design	5000	Aft (Sta. 101.5)	Clean
Design	5000	Forward (Sta. 95.5)	Clean
Overload	5000	Aft (Sta. 101.5)	Clean
Design	10,000	Aft (Sta. 101.5)	Clean
Design	5000	Aft (Sta. 101.5)	Armed (XM-7 or XM-8)

All tests were conducted in non-turbulent atmospheric conditions. The design gross weight and overload gross weight for the OH-5A are 2530 pounds (plus or minus 5 percent) and 3000 pounds respectively. The longitudinal C.G. envelope was Station 95.5 (forward) to Station 101.5 (aft), and the lateral C.G. envelope was 2.5 inches right to 2.5 inches left of the aircraft centerline.

In all cases tested, the maximum speed for level flight (V_{MAX}) was limited by power available, or longitudinal control available. 1bL

The armament firing tests were conducted at design gross weight at a forward C.G. which is a representative service loading, over a density altitude range of 3000 to 5000 feet. The armament

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equipment was maintained and serviced by U. S. Army Aviation Test Activity personnel. Personnel from Springfield Armory, Springfield, Massachusetts participated in the firing tests in a consulting and advisory capacity.

The stability and control tests were conducted in the following sequence: the static stability tests were conducted first at the lower altitude and gross weight combinations. After a major portion of the static stability tests was completed, the dynamics and controllability tests were initiated. Maximum flying safety was attained by the use of this sequence of testing.

The rigging of the aircraft's flight controls was checked prior to the first test flight to check conformity with the manufacturer's specifications. At various times during the test program, the control rigging was re-checked to determine any change which might have occurred. A change in a control component was followed by a test flight to determine if the stability and control characteristics were changed. In all cases where a flight control component was changed, no variations in stability and control qualities were noted.

The stability and control characteristics of the OH-5A were checked for their conformity to MIL-H-8501A, where applicable. In addition, a comparison with the OH-13H and OH-23D helicopters' stability and control characteristics was made, where possible, in this report.

All test data was acquired by sensitive instrumentation and hand-recorded or recorded on an oscillograph. A total of fourteen parameters were recorded on an oscillograph while seven additional calibrated instruments were installed on the instrument panel. The installed test instrumentation weighed approximately 110 pounds. The airspeed and altitudes referred to in this report are calibrated airspeed (CAS) and density altitude (H_D) respectively, unless otherwise stated.

2.1 STATIC TRIM STABILITY

2.1.1 OBJECTIVE

The objective of these tests was to determine the static trim stability and flying qualities at a series of trim airspeeds during level flight.

2.1.2 METHOD

Tests were conducted during level flight at the flight conditions specified in 2.0, "INTRODUCTION."

The helicopter was stabilized at each trim airspeed by varying the control positions and power as required to maintain level flight. Zero angle of sideslip was maintained for all trim conditions. The sideslip indicator was part of the test instrumentation and is not standard equipment.

2.1.3 RESULTS

The results of the static trim stability tests are presented in Figures No. 1 through 4, Section 3, Appendix I.

2.1.4 ANALYSIS

2.1.4.1 Quantitative Engineering Analysis of Static Trim Stability

a. Clean Configuration

The static trim stability as indicated by an increasing forward cyclic displacement with increasing airspeed was positive as airspeed was increased, and, the magnitude of the longitudinal trim change with changing airspeed was not excessive. No abrupt control position discontinuities with change in airspeed were observed under any flight condition tested.

Extrapolation of the trim curve for the design gross weight (2530 pounds) aft C.G. at 5000 feet indicates that the OH-5A was longitudinally control limited at 117 knots calibrated airspeed (KCAS) and reached 10 percent of remaining available travel at 104 KCAS in violation of MIL-H-8501A, paragraph 3.2.1. This is less than the design never-exceed airspeed (V_{NE}) for the OH-5A, which at 5000 feet is 110 KCAS.

The overload gross weight tests were conducted at an aft C.G. loading (Station 101.8). Under these conditions, 10 percent remaining available longitudinal control travel was reached at approximately 90 KCAS. This is approximately the same as V_{NE} under these conditions.

Increasing forward cyclic control was required as altitude was increased at a constant calibrated airspeed, but the decrease in the V_{NE} above 5000 feet made this condition less critical from a longitudinal control margin standpoint than the 5000-foot, aft C.G. case.

b. Armed Configuration

There was no problem with encountering control margins when the XM-7 armament kit was installed with the

horizontal tail repositioned at 6-1/2 degrees nose-down incidence. With the XM-8 kit installed, however, extrapolation of the trim curves indicated a 10 percent longitudinal controllability limit of 101 KCAS, which made this configuration slightly more critical than the clean configuration, design gross weight, aft C.G. case.

2.1.5 QUALITATIVE PILOT'S COMMENTS ON STATIC TRIM STABILITY

Clean and Armed Configuration

The OH-5A exhibited acceptable static trim stability. At the aft C.G. loading in both the clean and XM-8 configurations, the longitudinal control was uncomfortably near the longitudinal control stop.

The longitudinal and lateral cyclic control harmony in all configurations tested throughout the level flight speed range was satisfactory. Pedal forces were high throughout the level flight speed range and not in harmony with the cyclic control forces.

The large nose-down fuselage attitude encountered at a forward C.G., particularly with the armament systems installed, was objectionable. This nose-down attitude was uncomfortable for the crew and the discomfort was exaggerated by the lack of restraint provided by the shoulder harness.

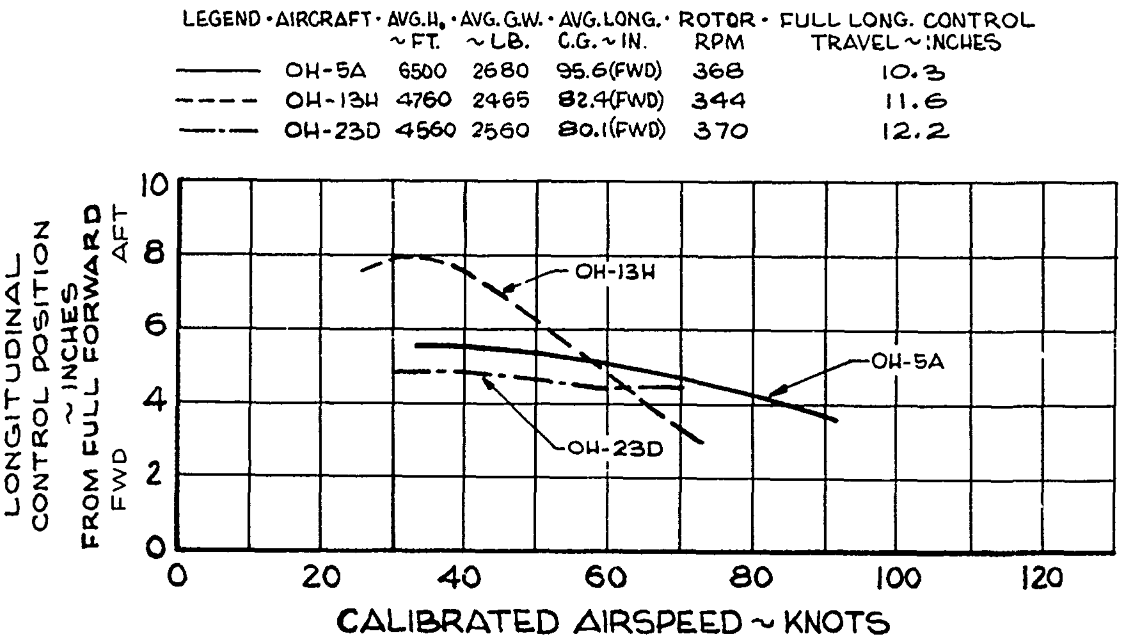
The OH-5A, at a forward C.G. with the crew wearing parachutes, was aft longitudinally control limited as the cyclic stick contacts the pilot's abdomen. This condition was particularly severe during transition from forward flight to a hover. The longitudinal control position instability occurring at transition airspeed in most helicopters did not appear to be present in the OH-5A.

2.1.6 COMPARISON OF THE STATIC TRIM STABILITY OF THE OH-5A AND THE OH-13H AND OH-23D

A comparison between the static longitudinal trim stability of the OH-5A and that of the OH-13H and OH-23D is shown in Figure A. (See following page for Figure A)

The OH-5A exhibited more positive longitudinal trim stability than the OH-23D and less than that of the OH-13H in the configurations shown in Figure A. The tendency of the OH-23D to approach neutral stability at higher airspeeds was not present in the OH-5A. The negative stability exhibited by the OH-13H at low airspeeds did not appear to be present in the OH-5A, although sufficient quantitative data were not obtained to verify this conclusion.

FIG. A
STATIC LONGITUDINAL TRIM STABILITY



2.2 STATIC LONGITUDINAL COLLECTIVE FIXED STABILITY

2.2.1 OBJECTIVE

The objective of the static longitudinal collective fixed stability tests was to measure quantitatively the helicopter stability and flying qualities as airspeed was varied about a trim airspeed at a fixed collective setting.

2.2.2 METHOD

Static collective fixed stability tests were conducted at the following configurations and trim airspeeds in level flight:

Gross Weight	Density Altitude ~ feet	Center of Gravity	Configuration	Trim Airspeeds
Design	5000	Aft	Clean	35 kt., $.8V_{MAX}$, V_{MAX}
Design	5000	Fwd	Clean	35 kt., $.8V_{MAX}$, V_{MAX}
Overload	5000	Aft	Clean	35 kt., $.8V_{MAX}$, V_{MAX}
Design	10,000	Aft	Clean	35 kt., $.8V_{MAX}$, V_{MAX}
Design	5000	Aft	XM-7	35 kt., $.8V_{MAX}$
Design	5000	Aft	XM-8	35 kt., $.8V_{MAX}$

Additional tests were conducted in each of the configurations in climbing flight at the best climb speed and in autorotation at the airspeeds for minimum rate of descent and minimum angle of descent. The effect of the stability augmentation system (SAS) on the static longitudinal collective fixed stability was determined by conducting tests with the SAS "off."

The airspeed was varied about each trim position using the cyclic control and pedals. The control positions for each stabilized point were recorded. All points were recorded at zero sideslip angle.

2.2.3 RESULTS

The results of the collective fixed stability tests are presented in Figures No. 5 through 26, Section 3, Appendix I.

2.2.4 ANALYSIS

2.2.4.1 Quantitative Engineering Analysis of Static Longitudinal Collective Fixed Stability

a. Clean Configuration

Positive static longitudinal control position stability with respect to airspeed was exhibited by the OH-5A under all conditions tested.

The degree of positive stability as indicated by the longitudinal cyclic position airspeed gradient at the design gross weight aft C.G. increased slightly from 35 KCAS to 78 KCAS, then decreased rather rapidly as the airspeed was further increased. Extrapolation of the summary static longitudinal collective fixed plot, Figure No. 5, Section 3, Appendix I, indicates that the control position stability would be slightly positive at the design V_{NE}. Climb and autorotation exhibited essentially the same degree of positive stability as level flight.

The degree of positive stability increased, as would be expected, as the C.G. moved forward and was independent of airspeed at the forward C.G. limit. The longitudinal static stability in climb was essentially the same as in level flight. A decrease in stability as compared with climb was observed in autorotation.

The overload gross weight and the 10,000 foot aft C.G. conditions exhibited essentially the same longitudinal control position static stability characteristics as the design gross weight, aft C.G. case previously mentioned. In both cases the airspeed at which the level of stability begins to decrease

was lower than that for the design gross weight aft C.G. case, indicating that the degree of stability is probably a strong function of thrust coefficient and airspeed. No change in the collective fixed static stability was observed with the SAS "off."

b. Armed Configuration

The degree of positive static stability with the XM-7 and XM-8 armament systems installed increased rapidly with airspeed and is in all cases, positive.

2.2.5 QUALITATIVE PILOT'S COMMENTS ON STATIC LONGITUDINAL COLLECTIVE FIXED STABILITY

Clean and Armed Configurations

The longitudinal control position gradient with airspeed was positive for all conditions tested and meets the requirements of the applicable sections of MIL-H-8501A.

The lateral cyclic control moved to the right as airspeed was increased in all configurations tested, however, this was not considered objectionable.

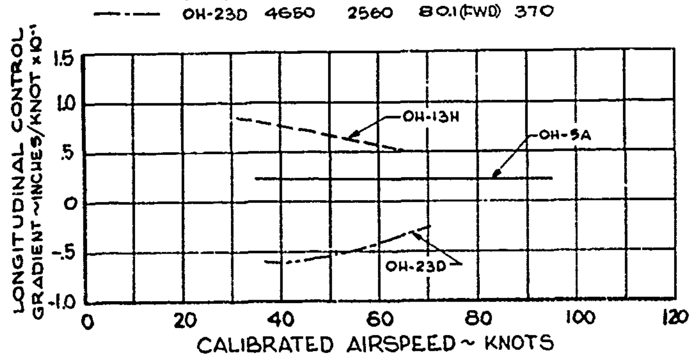
Stabilizing at higher airspeeds was difficult with the XM-7 installed because of an apparent longitudinal instability manifesting itself in a tucking tendency. (This comment is discussed in detail in the Static Lateral-Directional Stability section, 2.3.4.1)

2.2.6 COMPARISON OF THE STATIC LONGITUDINAL COLLECTIVE FIXED STABILITY OF THE OH-5A, AND THE OH-13H AND OH-23D

Figure B compares the collective fixed static stability of the OH-5A and the OH-13H and OH-23D.

FIG. B
STATIC LONGITUDINAL
COLLECTIVE FIXED STABILITY

LEGEND	AIRCRAFT	AVG H_0 ~FT.	AVG.G.W. ~LB.	AVG C.G. ~INCHES	ROTOR RPM
———	OH-5A	5440	2660	95.5(FWD)	368
-----	OH-13H	5100	2475	86.1(FWD)	344
—·—	OH-23D	4650	2560	80.1(FWD)	370



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In the configurations compared in Figure B, the OH-5A exhibited a higher degree of longitudinal stability than the OH-23D, which exhibited negative stability, and less stability than the OH-13H.

The OH-13H has good static longitudinal stability characteristics and the OH-23D has objectionable static longitudinal flying qualities.

2.3 STATIC LATERAL-DIRECTIONAL STABILITY

2.3.1 OBJECTIVE

The objectives of the static lateral-directional tests were to determine the directional stability and the effective dihedral characteristics throughout the flight envelope.

2.3.2 METHOD

Static lateral-directional stability was evaluated by recording the control positions required to maintain constant heading sideslips. The airspeed was held constant throughout the sideslip. Tests were conducted in the following configurations and airspeeds in level flight:

Gross Weight	Density Altitude ~ feet	Center of Gravity	Configuration	Trim Airspeeds
Design	5000	Aft	Clean	35 kt., $.8V_{MAX}$, V_{MAX}
Design	5000	Fwd	Clean	35 kt., $.8V_{MAX}$, V_{MAX}
Overload	5000	Aft	Clean	35 kt., $.8V_{MAX}$, V_{MAX}
Design	10,000	Aft	Clean	35 kt., $.8V_{MAX}$, V_{MAX}
Design	5000	Aft	XM-7	35 kt., $.8V_{MAX}$
Design	5000	Aft	XM-8	35 kt., $.8V_{MAX}$

Additional tests were conducted in each of the above configurations in climbing flight at the best climb speed and in autorotation at the airspeeds for minimum rate of descent and minimum angle of descent. The effect of the SAS on the static lateral-directional stability was evaluated by conducting tests with the SAS "off."

2.3.3 RESULTS

The results of the static lateral-directional stability tests are presented in Figure No. 27 through 57, Section 3, Appendix I.

2.3.4 ANALYSIS

2.3.4.1 Quantitative Engineering Analysis of Static Lateral-Directional Stability

a. Clean Configuration

The control fixed static directional stability as indicated by the variation of pedal position with sideslip angle was positive and essentially linear for all conditions tested. Figure No. 27, Section 3, Appendix I shows that the value of the pedal position versus sideslip angle gradient is essentially constant for all conditions tested and independent of gross weight, altitude or armament configuration. The side force during sideslip, as indicated by the variation of bank angle with sideslip angle, was positive and satisfactory in all configurations tested.

The effective dihedral as indicated by the variation of lateral control position with sideslip angle was initially positive for all SAS "on" flight conditions tested. The dihedral effect in the clean configuration, at an aft C.G., design gross weight, and low speeds remained positive and linear at 35 KCAS, to over 45 degrees of sideslip. As airspeed was increased, the dihedral effect approached neutral at progressivley smaller angles of sideslip. The requirement of MIL-H-8501A, paragraph 3.3.9, for positive linear dihedral effect out to 15 degrees of sideslip at V_{MAX} was not met because neutral dihedral effect was encountered with 7-1/2 degrees of left sideslip and 12 degrees of right sideslip at V_{MAX} (98 knots). The dihedral effect in climbing flight in this configuration was positive and similar to that encountered in level flight at similar airspeeds. The dihedral effect in autorotation was weak and became weaker as airspeed was increased. The effect of the SAS was to increase the dihedral effect in all configurations tested. The dihedral effect in autorotations with the SAS "off" was neutral from zero sideslip. A nose-down longitudinal trim change occurred at V_{MAX} in this configuration at angles of sideslip greater than 10 degrees. This tucking tendency was most severe in left sideslip.

The dihedral effect at the overload gross weight was slightly improved over that of the design gross weight; primarily because of power limitations, the higher airspeeds could not be attained.

The dihedral effect at design gross weight, aft C.G. and 10,000 feet exhibited essentially the same characteristics in level flight and climbing flight as at 5000 feet. The dihedral effect in autorotations at this configuration and altitude was essentially neutral from zero sideslip.

b. Armed Configuration

The static directional stability and the effective dihedral with the XM-7 installed were essentially the same as for the clean configuration. A longitudinal nose-down trim change occurred at higher airspeeds (i.e., above 60 KCAS) as left sideslip was entered and continued to increase as the sideslip increased (See Figure No. 51, Section 3, Appendix I). This tucking tendency appeared to increase with forward speed. This accounted for pilot comments concerning apparent longitudinal instability at higher airspeeds with the XM-7 installed. A slight excursion in left sideslip would tend to drop the nose, requiring pilot effort to bring the aircraft back to trim attitude.

The static directional stability and the effective dihedral with the XM-8 installed were essentially the same as observed with the clean configuration. There were no objectionable longitudinal trim changes with sideslip in this configuration.

2.3.5 QUALITATIVE PILOT'S COMMENTS ON STATIC LATERAL-DIRECTIONAL STABILITY

Clean and Armed Configurations

Weak dihedral effect coupled with longitudinal trim changes with sideslip made stabilizing at higher sideslip angles at high airspeeds difficult. This condition was aggravated with the SAS "off" because of the reduced dihedral effect and damping. This condition was most severe during autorotations, particularly with the SAS "off."

Bank angles at the larger angles of sideslip were uncomfortable because of the lack of restraint afforded by the shoulder harness.

2.3.6 COMPARISON OF THE STATIC LATERAL-DIRECTIONAL STABILITY OF THE OH-5A AND THE OH-13H AND OH-23D

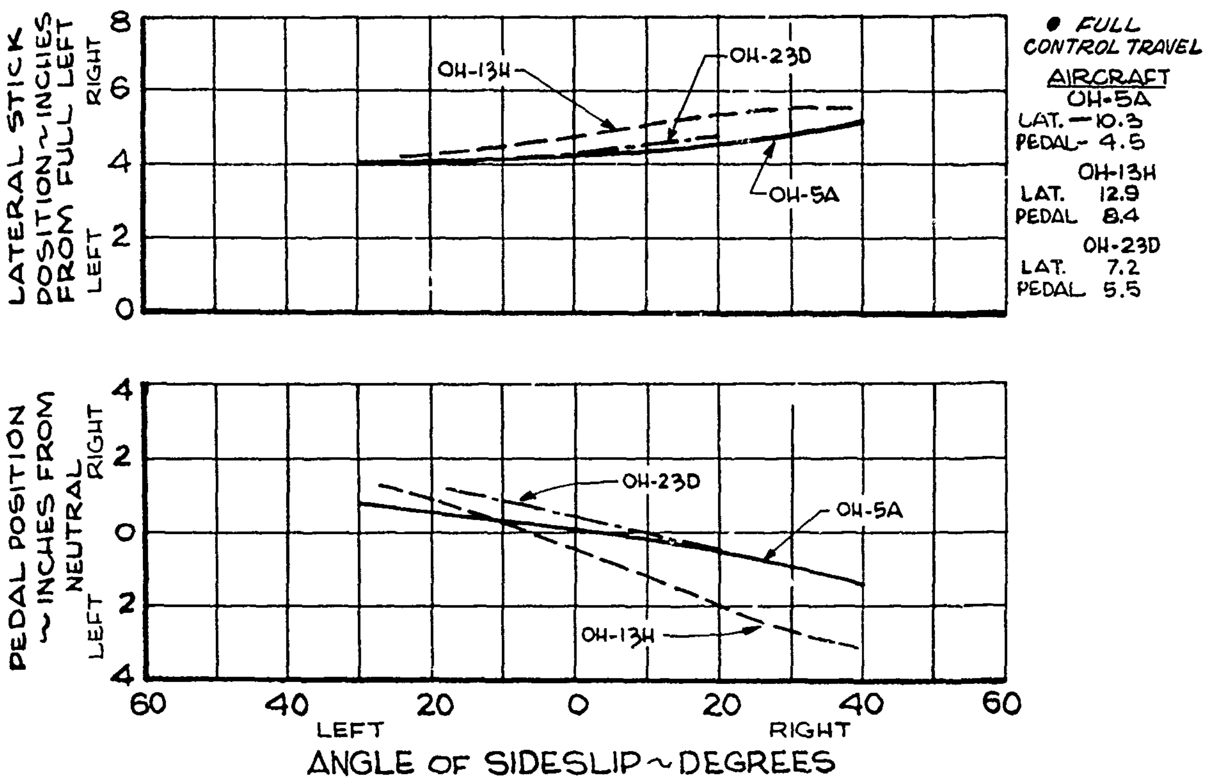
Figure C (see following page) compares the static lateral-directional stability of the OH-5A and the OH-13H and OH-23D.

There was little difference in the directional stability of the three helicopters as indicated by the gradient of pedal

FIG. C

STATIC LATERAL – DIRECTIONAL STABILITY

LEGEND	AIRCRAFT	CAS ~KTS	AVG. H_D ~FT.	AVG. G.W. ~LB.	AVG. C.G. ~INCHES	ROTOR RPM
———	OH-5A	33	4800	2570	101.3(AFT)	368
– – – –	OH-13H	35	5100	2490	84.7(MID)	344
—·—	OH-23D	35	5075	2570	80.1(FWD)	370



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deflection versus sideslip. All helicopters possess positive stability and exhibit essentially a linear variation of pedal position with sideslip.

The OH-5A exhibited weaker dihedral effect than either the OH-13H or OH-23D, as shown by the lateral control requirements for trimmed flight in a sideslip.

2.4 SIDEWARD AND REARWARD FLIGHT

2.4.1 OBJECTIVE

The objective of the sideward and rearward flight tests was to determine the control required to hover in winds at the most critical loading conditions.

2.4.2 METHOD

Cross wind and tail wind conditions were simulated by flying the helicopter sideward (left and right) and rearward in calm air. A calibrated pacer ground vehicle was used to record ground speed as the helicopter was stabilized at various airspeeds. Tests were conducted in both sideward and rearward flight at a forward C.G. and design gross weight with a near mid lateral C.G. Additional tests were conducted in sideward flight at an aft C.G., design gross weight and left lateral C.G. loading. No tests were conducted with the SAS "off."

2.4.3 RESULTS

The results of the sideward and rearward flight tests are presented in Figures No. 58 through 60, Section 3, Appendix I.

2.4.4 ANALYSIS

2.4.4.1 Quantitative Engineering Analysis of Sideward and Rearward Flight

Clean Configuration

The OH-5A exhibits excellent rearward flying qualities. During rearward flight at 25 knots true airspeed (KTAS) at the forward C.G. limit, approximately 1.5 inches of aft longitudinal control travel remained. There were no abrupt control discontinuities as rearward flight speed was increased.

In sideward flight, sufficient directional control was available to fly the OH-5A faster than 35 KTAS to either the left or the

right. A rapid increase in right pedal was required in left sideward flight as the area of translation was approached. This required rather large pedal inputs for small changes in sideward airspeed and made stabilizing at these speeds difficult. No other control discontinuities were observed.

The lateral cyclic control required in sideward flight was essentially linear with airspeed and exhibited a very flat gradient with sideward airspeeds. This characteristic tended to make the pilot overcontrol laterally when hovering in a gusty cross wind over a spot. Sufficient lateral control remained at the asymmetric lateral C.G. (2.1 inches left) to fly to sideward true airspeeds of greater than 30 KTAS.

2.4.5 QUALITATIVE PILOT'S COMMENTS ON SIDEWARD AND REARWARD FLIGHT

Clean Configuration

No problems were encountered with the OH-5A in rearward flight. At the forward C.G. tested, sufficient aft longitudinal control was available to fly faster than 25 KTAS rearward.

As the OH-5A was moved into left sideward flight, large pedal inputs were required, making stabilization on a desired heading difficult. Random directional hunting occurred below 15 KTAS making stabilization difficult. The helicopter was smooth above 15 KTAS to either the left or right, with minimum control movements being necessary to maintain a desired heading.

Quartering winds of approximately 15 knots from the right front required full left pedal to hold a constant heading. As the relative wind angle approached a direct right cross wind, however, sufficient directional control was available to exceed 30 KTAS in right sideward flight.

2.4.6 COMPARISON OF THE SIDEWARD AND REARWARD FLIGHT OF THE OH-5A AND THE OH-13H

Figures D and E (see following pages) compare the sideward and rearward flight characteristics of the OH-5A and the OH-13H.

The OH-5A and OH-13H exhibited similar characteristics in sideward flight. Both were capable of hovering in a 30 knot cross wind with no control limitations.

The OH-13H was control limited in rearward flight at approximately 16 KTAS, whereas the OH-5A had more than 10 percent aft longitudinal control remaining at 25 KTAS.

FIG. D
CONTROL POSITIONS
IN SIDEWARD FLIGHT

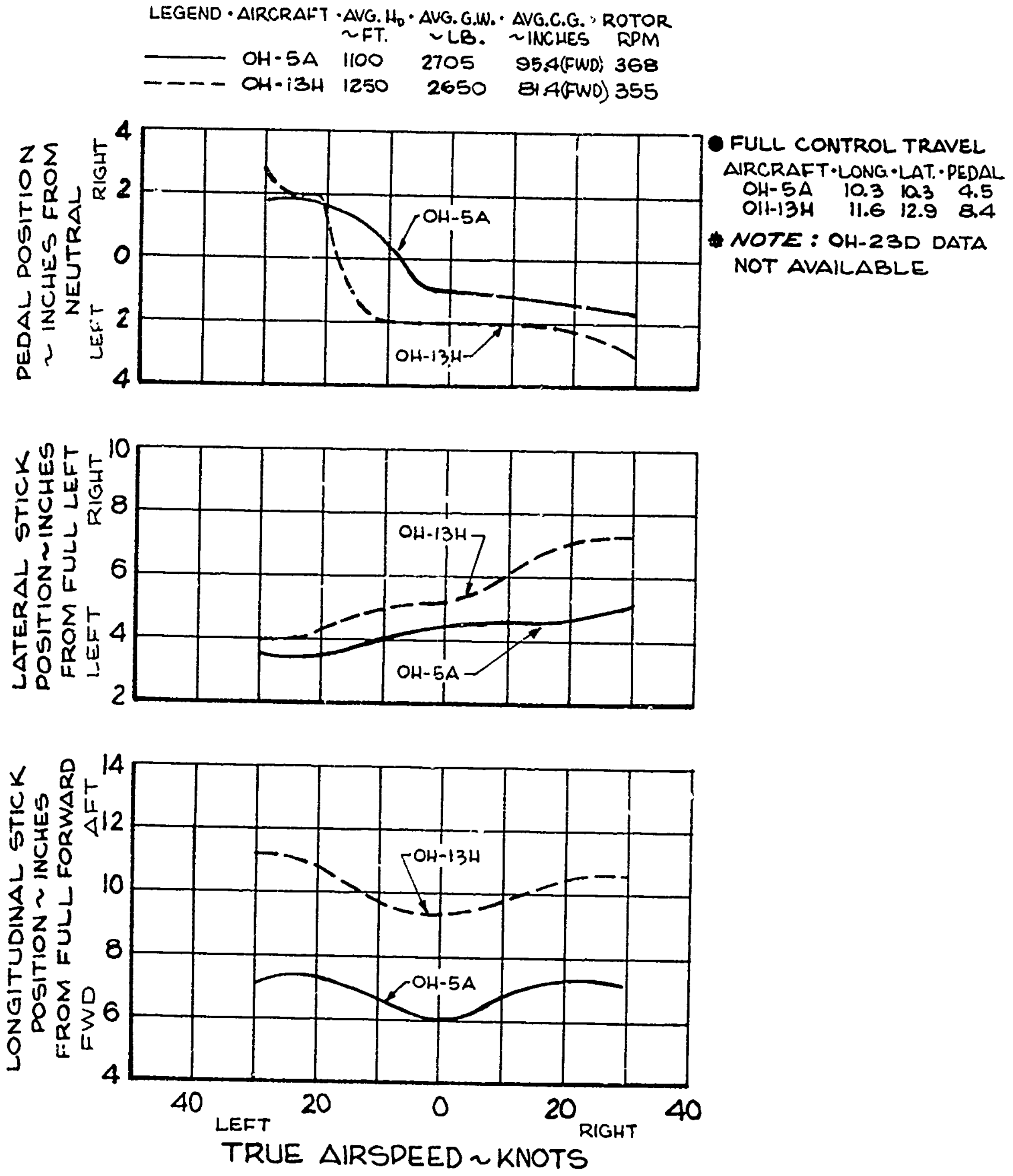
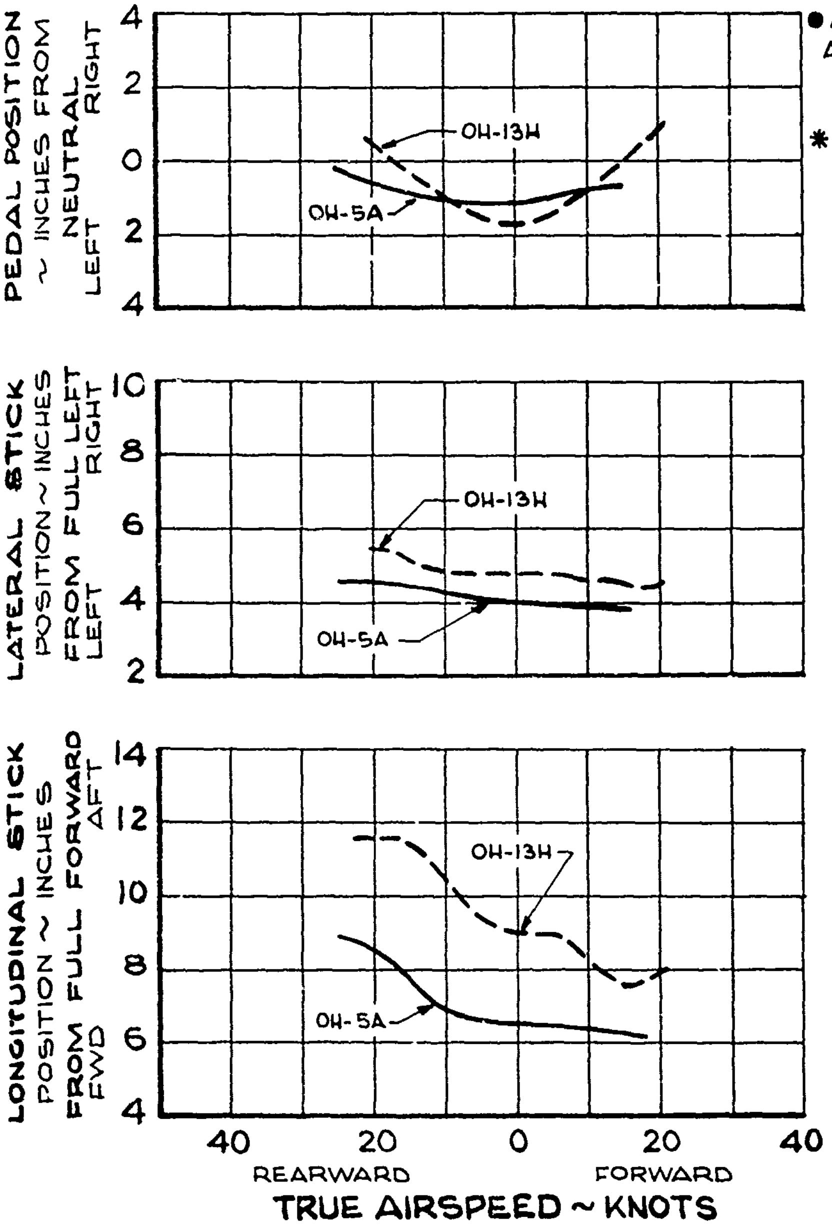


FIG. E

CONTROL POSITION
IN REARWARD FLIGHT

LEGEND	AIRCRAFT	AVG. H_p ~ FT.	AVG. G.W. ~ LB.	AVG. C.G. ~ INCHES	ROTOR RPM
———	OH-5A	1200	2595	95.3 (FWD)	368
— — —	OH-13H	1250	2455	83.3 (FWD)	355



● FULL CONTROL TRAVEL

AIRCRAFT	LONG	LAT	PEDAL
OH-5A	10.3	10.3	4.5
OH-13H	11.6	12.9	8.4

* NOTE: OH-23D DATA NOT AVAILABLE

2.5 DYNAMIC STABILITY

2.5.1 OBJECTIVE

The objectives of the dynamic stability tests were: (1) to determine the aircraft characteristic motion when artificially disturbed from a trimmed flight condition, (2) to evaluate the change in dynamic stability with the different armament kits installed and (3) to conduct a limited evaluation of the dynamic stability with the SAS "off."

2.5.2 METHOD

The dynamic stability characteristics were determined by recording the helicopter motions that resulted from pulse-type control inputs. A control fixture was used to insure that the inputs were of uniform size and of the desired magnitude. The pulse input was accomplished by displacing the control for the desired axis approximately 1 inch, holding it in this position from 0.5 to 1.0 seconds, then returning the control to the trim position. This trim control position was then maintained until the aircraft became stabilized or recovery was necessary. Control positions, aircraft attitudes, and rates were recorded for each pulse input. The tests were conducted on all axes in climbing flight at the best climb speeds, in autorotation at the speed for minimum descent, and in level flight at 35 knots calibrated airspeed (KCAS), $.8V_{MAX}$ and V_{MAX} for the configurations specified in 2.0, "INTRODUCTION."

2.5.3 RESULTS

Time histories are presented in Figures No. 61 through 103, Section 3, Appendix I.

2.5.4 ANALYSIS

2.5.4.1 Quantitative Engineering Analysis of Dynamic Longitudinal Stability

a. Clean Configuration

The response of the OH-5A to longitudinal disturbances with the SAS "on" was satisfactory in all flight regimes tested and meets the requirements of MIL-H-8501A.

At the design gross weight, aft C.G., with the SAS "on" in a hover, a longitudinal disturbance resulted in a rather slow steady state translational velocity in the direction of the disturbance. All forward speeds in level flight, climb and autorotation were characterized by a deadbeat recovery in pitch, with

negligible coupling in roll or yaw. Center of gravity, gross weight or altitude did not appreciably change the longitudinal dynamic stability characteristics noted for the aft C.G. case.

Aft longitudinal disturbances with the SAS "off" in the clean configuration resulted in a long period (i.e., greater than 15 seconds) unstable spiral mode. The pitch rate initially followed the control input; then, as soon as the control was returned to trim, a nose-down pitch rate developed which was 12 degrees/second, and increasing as the aircraft passed the nose level attitude. The rate stabilized at a constant value shortly after this and a tightening "graveyard" spiral resulted, recovery from which became necessary approximately 10 seconds after the disturbance. A forward longitudinal disturbance resulted in a climbing right turn with a constant rate pitch-up (8 degree/second constant pitch rate). Recovery from this maneuver became necessary approximately 8 seconds after the disturbance. There was negligible oscillatory coupling in roll and yaw following a longitudinal disturbance. Airspeed, altitude or flight condition had only minor effect on the motion described above. The divergence rate appeared to increase slightly at the forward C.G.

b. Armed Configuration

There was no apparent difference in the longitudinal dynamic stability characteristics of the OH-5A with the armament kits installed and the SAS "on" from that previously described. No tests were conducted in the armed configuration with the SAS "off."

2.5.4.2 Quantitative Engineering Analysis of Dynamic Lateral Stability

a. Clean Configuration

The response of the OH-5A to lateral disturbances with the SAS "on" was satisfactory in all flight regimes tested.

Lateral disturbances with the SAS "on" in hover in ground effect (IGE) at an aft C.G. and at design gross weight were characterized by a near deadbeat roll recovery with negligible pitch coupling followed by a constant residual yawing velocity in the direction of the disturbance. In this configuration with the SAS "on" at all level flight airspeeds, in climb and autorotation, the aircraft recovery to a lateral disturbance was deadbeat with negligible pitch-yaw coupling. Center of gravity, gross weight or altitude had no appreciable effect on the lateral dynamic stability described.

A right lateral pulse with the SAS "off" at the aft C.G. in the clean configuration results in a long period primary

pitch and roll mode coupled with a shorter period oscillatory yaw mode. At 35 KCAS, the aircraft initially entered a climbing left turn, recovered and entered a right spiral mode, then recovered and repeated the cycle. The amplitude and period of these motions increased with each succeeding cycle. At 78 KCAS, the aircraft entered a right spiral, recovered and entered a divergent pitch-up in a left climbing turn. Recovery became necessary at this point, 7 to 8 seconds after the disturbance. The response to a left lateral disturbance was similar, with slightly more oscillatory yaw coupling present. Very limited data was gathered in climb and autorotation, but there did not appear to be any significant difference in the motions described above. The effect of C.G., gross weight or altitude was not evaluated with the SAS "off."

b. Armed Configuration

There was no apparent change in the lateral dynamic characteristics of the OH-5A with the armament installed and the SAS "on." No tests were conducted in the armed configuration with the SAS "off."

2.5.4.3 Quantitative Engineering Analysis of Dynamic Directional Stability

a. Clean Configuration

The response of the OH-5A to directional disturbances was satisfactory with the SAS "on" in all flight regimes tested and was unacceptable with SAS "off."

Directional disturbances in a hover (IGE) at an aft C.G. and design gross weight with the SAS "on" resulted in a steady state yawing velocity in the direction of the disturbance, with negligible pitch or roll coupling.

Directional pulses during level flight and autorotation with the SAS "on" were characterized by a near deadbeat response in yaw with slight pitch and roll coupling.

A heavily damped dutch roll oscillation (i.e., damping to 1/2 amplitude in 1 cycle) coupled with a roll oscillation of approximately 1/2 the magnitude of the yaw oscillation occurred following a right directional pulse in a climb with the SAS "on." The period of this oscillation was approximately 1.5 seconds. The oscillations damped out in 3 - 4 cycles and met the requirements of MIL-H-8501A, paragraph 3.2.11.

A slight decrease in damping was observed in all flight conditions at the forward C.G. at both design and overload gross

weight configurations with the SAS "on." The oscillatory motion for all level flight conditions at the forward C.G. was similar to that described above for the climb condition and was not objectionable. Altitude had no noticeable effect on the directional damping characteristics.

The dynamic directional stability characteristics on the OH-5A with the SAS "off" were objectionable and considered dangerous. A directional disturbance resulted in a highly coupled complex aircraft motion. A lightly damped dutch roll oscillation with a varying roll-yaw ratio, depending upon the direction, was initially encountered. The period of this oscillation was initially approximately 1 - 2 seconds, this approaches the pilot-aircraft reaction time and may result in pilot-induced oscillations. The length of this period increased with time and a divergent long period pitch coupling (usually nose-down) was introduced. This complex motion resulted in the pilot having no feeling for what the aircraft will do next. This, coupled with an ideal situation for pilot-induced oscillations, makes flying the aircraft with SAS "off" in turbulent air particularly hazardous (See 2.5.5.3 for Pilot Comments).

b. Armed Configuration

The damping decreased slightly with the relatively high inertia XM-7 installation. This decrease in damping resulted in characteristics similar to those previously described for the climb condition at an aft C.G. and was not objectionable. The installation of the XM-8 did not significantly alter the directional dynamic stability characteristics previously described for the clean, aft C.G. case. No SAS "off" dynamic directional stability tests were conducted with the XM-7 or XM-8 installed.

2.5.5 QUALITATIVE PILOT'S COMMENTS ON DYNAMIC STABILITY

2.5.5.1 Qualitative Pilot's Comments on Dynamic Longitudinal Stability

Clean and Armed Configurations

The OH-5A with the SAS "on" exhibited satisfactory dynamic longitudinal stability characteristics. The response of the aircraft to longitudinal disturbances was, in all cases tested, deadbeat.

The SAS "off" characteristics were unacceptable. The aircraft, when disturbed in pitch, entered a long period unstable spiral mode. The aircraft reaction was particularly alarming following a nose-up disturbance because of the increasing nose-down pitching rate encountered as the aircraft passed through the nose level position. This rate increase following a relatively docile initial response was particularly alarming.

2.5.5.2 Qualitative Pilot's Comments on Dynamic Lateral Stability

Clean and Armed Configurations

With the SAS "on", the dynamic lateral stability was satisfactory and meets the requirements of MIL-H-8501A. Lateral pulses in all forward flight conditions tested resulted in deadbeat response. Hovering (IGE) lateral pulses resulted in a deadbeat roll recovery followed by a residual yawing velocity in the direction of the input.

Lateral disturbances with the SAS "off" resulted in a long period pitch divergence with random roll and yaw coupling. Disturbances about this axis were not as severe as about the pitch and yaw axes.

The best technique determined during this evaluation for preventing excessive rate buildup in turbulence was to minimize cyclic control movements. This tended to prevent the pilot from self-inducing and amplifying oscillations. Flying in turbulence required less pilot effort with the trim feel system button depressed. This relieved the breakout forces and made control easier. A switch to cut off the feel system would make flying in turbulence with the SAS "off" easier.

2.5.5.3 Qualitative Pilot's Comments on Dynamic Directional Stability

Clean and Armed Configurations

The dynamic directional stability characteristics of the OH-5A with the SAS "on" were satisfactory and meet the requirements of MIL-H-8501A. Directional disturbances in all the flight conditions tested were either deadbeat or very heavily damped except for hovering during which the lack of damping caused a residual yaw rate in the direction of the disturbance. There was no tendency for the helicopter to windup in yaw (i.e., the yaw rate stabilized at a value and did not tend to increase).

The dynamic directional stability characteristics with the SAS "off" were unacceptable. In moderate or greater turbulence, it is doubtful whether an average pilot could maintain control of the aircraft. The unpredictability of the aircraft and "lack of feel" for what it will do next made control very difficult. In one case, with a test pilot experienced in the OH-5A at the controls with the SAS "off" in moderate turbulence, a tri-axial oscillation developed which resulted in the nose of the aircraft describing approximately a 30 degree circle with the pilot attempting to maintain control. The recovery technique used was the same as that previously discussed in the lateral control section, 2.5.5.2.

2.5.6 COMPARISON OF THE DYNAMIC STABILITY OF THE OH-5A AND THE OH-13H AND OH-23D

The OH-5A with the SAS "on" exhibited dynamic stability characteristics which are superior to those of both the OH-13H and OH-23D, neither of which utilizes a SAS.

The OH-13H and OH-23D exhibit a long period divergent oscillation about the pitch and roll axes following a disturbance. The OH-5A, with the SAS "on", under all flight conditions and in all configurations, exhibited a near deadbeat response to a longitudinal or lateral distrubance. The oscillations of the OH-5A, following a directional distrubance, were more heavily damped than those of either the OH-13H or the OH-23D.

The OH-5A with the SAS "off", possessed dynamic stability that was inferior to that of either the OH-13H, which is considered good, or the OH-23D, which is considered marginal.

2.6 <u>CONTROLLABILITY</u>

2.6.1 OBJECTIVE

The objectives of the controllability tests were to determine the maximum angular acceleration (sensitivity) and rates (response) that result per inch of rapid step control input. Additional tests were conducted to investigate changes caused by the armament installations.

2.6.2 METHOD

The controllability characteristics were evaluated by recording the motions that resulted from step-type control inputs. A control fixture was used to control the magnitudes of the step inputs. The step inputs were accomplished by rapidly displacing the control to the desired position and then holding this position until the maximum rate was obtained or recovery was necessary. The tests were conducted for each control axis. Control positions, aircraft attitudes and rates were recorded for each step input. The tests were conducted in the clean and armed configurations at average density altitudes of 5000 and 10,000 feet in forward flight and approximately 1500 feet in hover (IGE), with an aft C.G. location during the following maneuvers:

a. Hover (IGE)
b. Climb at V_{MAX} R/C
c. Level Flight at 55 KCAS and .8 V_{MAX}
d. Level Flight at V_{MAX} (clean configuration only)
e. Autorotation at V_{MIN} R/D

Additional tests were conducted at the forward C.G. at both a design and overload gross weight.

Limited tests were conducted with the SAS "off."

2.6.3 RESULTS

The results of the controllability are presented in Figures No. 104 through 194, Section 3, Appendix I.

2.6.4 ANALYSIS

The controllability or the ability of the pilot to maneuver the aircraft about a given axis was analyzed in terms of the following:

a. Sensitivity is defined as the maximum angular acceleration achieved per inch of cyclic control stick deflection. The magnitude of this parameter together with the time required to reach the maximum angular acceleration after a control input is an indication of how quickly the aircraft will react when commencing a maneuver.

b. Response is defined as the maximum rate of change of attitude of the aircraft about a given axis per inch of cyclic control stick deflection. The response, coupled with the time to reach the maximum rate is a direct indication of the maneuverability of the aircraft.

c. The angular displacement, after one second, is another measure of the maneuverability of the aircraft. This is of particular interest during hovering flight when attitude change is a direct measure of the translational acceleration and velocity.

2.6.4.1 Quantitative Engineering Analysis of Longitudinal Controllability

Clean and Armed Configurations

The OH-5A met the MIL-H-8501A, paragraph 3.2.13 hovering controllability criteria of attaining an angular displacement of at least 2.96 degrees 1 second after 1 inch longitudinal control displacement. The OH-5A achieved an angular displacement of 4.2 degrees aft and 3.5 degrees forward at an aft C.G., design gross weight. The angular displacement is 3.7 degrees forward and aft at a forward C.G. and at design gross weight. The sensitivity in a hover varied slightly with configuration between 13 and 16 degrees/sec^2/inch for an aft input of 11 and 13 degrees/sec^2/inch for a forward input. The angular acceleration in all configurations reached its maximum value between 0.3 and 0.4 second after the control input.

The response of the OH-5A varied from 5 to 7 degrees/sec/inch for a forward input, depending on configuration. These variances for both sensitivity and response are considered minor. For the configurations tested, there was no significant change in the hover controllability as a function of either C.G. or installation of the XM-8 armament. No hovering controllability tests were conducted at an overload gross weight or with the XM-7 installed. There was no appreciable change in controllability between hover and forward flight. There were no adverse control coupling effects about other axes due to longitudinal control inputs in a hover.

At all level flight configurations tested, with the exception of the overload gross weight configuration, controllability in terms of the response and sensitivity was independent of airspeed. At the overload gross weight condition, the sensitivity increased with airspeed, but decreased damping at this gross weight made the response independent of airspeed and equivalent to the design gross weight condition. There was a slight decrease in both the sensitivity and the response with increasing altitude. The forward inputs were more affected by altitude than the aft inputs. The effect of XM-8 armament on the longitudinal controllability was negligible. The higher inertia XM-7 installation resulted in a slight decrease in the sensitivity and an increase in the response. This response change is attributed to the decreased damping and was highest for an aft input. Limited SAS "off" tests were conducted, and, as would be expected, the sensitivity remained about the same as with the SAS "on"; however, the response was almost doubled because of the lack of SAS damping.

There was no adverse coupling in level flight as a result of longitudinal control inputs; however, a severe pitch-up was encountered at the aft C.G. at high airspeeds. Figure No. 191, Section 3, Appendix I, depicts the pitch-up resulting from an aft step at 78 knots calibrated airspeed (KCAS) with the SAS "on." The pitch rate damped in the normal manner for approximately 1.5 seconds after the control input and momentarily reached a maximum value. The rate then suddenly increased and continued to increase for 0.4 seconds after corrective control was applied. This is in direct violation of MIL-H-8501A, paragraph 3.2.11.1. There were no appreciable vibration increase or roll rates encountered, discounting the assumption that this effect was due to blade stall. Essentially the same condition could be duplicated with the SAS "off." Figure No. 192, Section 3, Appendix I depicts a similar pitch-up occurring during a climb at an aft C.G. with the SAS "off." This characteristic is considered a safety of flight condition.

The controllability in climb and autorotation was, in most cases, slightly less than that in level flight. The effects of gross weight and altitude were essentially the same as previously described for the level flight case. In most cases, the long-

itudinal controllability in climb and autorotation was essentially the same.

2.6.4.2 Quantitative Engineering Analysis of Lateral Controllability

Clean and Armed Configurations

The OH-5A, in all configurations tested, met the hovering lateral controllability criteria of MIL-H-8501A, paragraph 3.3.18, which requires a roll angle at the end of 1/2 second of 1.78 degrees. The lateral controllability of the OH-5A was only slightly dependent on the configuration and was approximately twice the specification requirement with the SAS "on." Hovering controllability in terms of the sensitivity was essentially the same for the forward and aft C.G. configuration and was 25 percent higher with the higher inertia XM-8. The lateral control response did not vary significantly (i.e., between 9 and 13 degrees/sec/inch in any of the configurations tested. Hovering controllability tests were not conducted at either the overload gross weight condition or in the XM-7 armament configuration. No adverse control coupling about other axes was observed as a result of lateral inputs. No SAS "off" hovering tests were conducted.

The lateral controllability in level flight in terms of the sensitivity increased with airspeed at the design gross weight in all clean configurations tested. There was no significant difference in the sensitivity between a forward and an aft C.G. at the design gross weight. The effect of gross weight (i.e., higher C_T) increased the right roll sensitivity irrespective of airspeed. The left roll sensitivity characteristics were unaffected by gross weight. The effect of altitude (i.e., higher CT) also significantly increased the right roll sensitivity. The sensitivity in a left roll was increased, but to a lesser extent than in a right roll. The sensitivity increased rapidly with airspeed at the design gross weight and 10,000 feet. The effect of both armament installations was to make the sensitivity independent of airspeed and equivalent to the high speed values determined for the clean configuration. The lateral control response of the OH-5A was essentially unaffected by airspeed and configuration. The lateral control response with the SAS "off" is increased by approximately 50 percent over the SAS "on" case, but this percentage increase was not as great as was noted previously for the longitudinal case. There was no objectionable control coupling with lateral control inputs.

The lateral sensitivity in climbs approximated that encountered in level flight at the same configuration and airspeed. The lateral sensitivity in autorotations was less than in level flight for all configurations, but was never objectionably low.

2.6.4.3 Quantitative Engineering Analysis of Directional Controllability

Clean and Armed Configuration

The OH-5A in all configurations tested met the hovering requirements of MIL-H-8501A, paragraph 3.3.5, which requires an angular yaw displacement of 7.23 degrees at the end of 1 second. The angular yaw displacement of the OH-5A at the end of 1 second was 26 degrees to the right and 20 degrees to the left at an aft C.G., design gross weight, and clean configuration, with only minor differences noted at the other configurations tested. The directional sensitivity in a hover was, in all cases tested, higher to the right (i.e., with the rotor torque) than to the left. The directional sensitivity was slightly higher at the forward C.G. location than at the aft C.G. because of the longer tail moment arm. The XM-8 armament installation had negligible effect on the directional sensitivity. The overload gross weight condition and the XM-7 armament installation were not evaluated in a hover. The low damping in a hover caused the directional control response characteristics to follow closely the trends discussed above for the sensitivity. A directional input in a hover resulted in a constant angular yaw velocity, which did not tend to windup. There was no objectionable control coupling following pedal inputs in a hover.

The directional control sensitivity in level flight was, in all cases tested, independent of airspeed and higher to the right than to the left. Slightly higher sensitivity was noted at the forward C.G. than at the aft C.G. Gross weight had no measurable effect on the directional sensitivity. Pedal inputs to the left (i.e., against the torque) at 10,000 feet resulted in less directional sensitivity than at the same condition at 5000 feet. The XM-8 installation had negligible effect on the directional sensitivity while the installation of the XM-7 resulted in a decrease in the directional sensitivity.

The directional control response characteristics of the OH-5A were essentially the same for all configurations tested. In the clean configuration, there were negligible differences with C.G. location, gross weight or altitude. In all cases, the increased directional damping, as airspeed increased, resulted in a decrease in the maximum rate developed. The installation of the XM-7 resulted in slightly higher maximum rates compared to those attained in the clean configuration. The XM-8 installation had negligible effect on the directional controllability.

A serious safety-of-flight condition was noted during right pedal inputs with the XM-7 installed. At high airspeeds following a right pedal input of less than 1 inch, a severe tucking occurred. This nose-down pitch was characterized by a divergent pitch rate. This condition also occurred in the clean configuration

at the forward C.G. at both the design and overload gross weights, but was not nearly so severe. A time history of this condition with the XM-7 installed is depicted in Figure No. 194, Section 3, Appendix I. This condition is considered a safety of flight condition.

The directional control sensitivity and response characteristics in climb and autorotation were essentially the same as previously described for the level flight case. In most cases, the directional sensitivity was less than in level flight; however, the directional response was, in all cases, essentially the same.

2.6.5 QUALITATIVE PILOT'S COMMENTS ON CONTROLLABILITY

2.6.5.1 Qualitative Pilot's Comments on Longitudinal Controllability

Clean and Armed Configurations

Longitudinal controllability was adequate in a hover to maintain position over a spot on the ground with small control movements. Control harmony with lateral control was acceptable. In a hover, there was no objectionable control coupling with other axes following a longitudinal input. There was no appreciable change in the longitudinal hover controllability with the various configurations tested. With the SAS "on", the longitudinal hovering controllability was acceptable and meets the requirements of MIL-H-8501A. Hovering with the SAS "off" is characterized by continuous "hunting" or "darting". This was objectionable and made precision hovering impossible even in smooth air.

In all level flight configurations tested, longitudinal controllability effects with C.G., gross weight and altitude appeared negligible.

A serious safety-of-flight condition existed at an aft C.G. location at high airspeeds. A divergent pitch-up with an alarming pitch rate increase, occurred following an aft step of less than 1 inch magnitude. This condition, particularly with the SAS "on", is considered a safety-of-flight condition. This pitch-up was not accompanied by the roll left and vibration increase normally expected with blade stall. Other than this case, there were no safety-of-flight longitudinal controllability implications revealed during the test program.

Longitudinal controllability characteristics in climb and autorotation with the SAS "on" were essentially the same as in level flight and were acceptable.

With the SAS "off", the longitudinal control was extremely sensitive with the rates generated for a given stick input were approximately twice those with the SAS "on." This gave the pilot the impression that the aircraft was very sensitive

longitudinally.

2.6.5.2 Qualitative Pilot's Comments on Lateral Controllability

Clean and Armed Configurations

Lateral controllability in a hover was satisfactory and should meet the requirements of MIL-H-8501A. The lateral control was sufficient to hold the aircraft accurately over a spot on the ground; however, the weak gradient of lateral cyclic position with sideward airspeed previously mentioned made hovering in gusty crosswinds difficult. The control harmony of the lateral control with the longitudinal control was acceptable. There was no objectionable control coupling about other axes with lateral control inputs. There was no significant change in lateral controllability in hovering with any of the configurations tested.

The lateral controllability in level flight with the SAS "on" appeared to remain essentially the same at all flight conditions and airspeeds tested. There did not appear to be any significant change in controllability with either C.G., gross weight, or armament configurations. There appeared to be an increase in the lateral sensitivity with altitude. This effect increased rapidly as the service ceiling was approached and gave the pilot the impression, under these conditions, that the aircraft was not fully under control.

Climb and autorotation lateral controllability characteristics with the SAS "on" were essentially the same as observed in level flight and were acceptable. There was no objectionable control coupling along other axes with lateral control inputs in either forward flight, climb or autorotation.

With the SAS "off", the lateral controllability increased significantly, but the percentage increase did not appear to be as much as about the pitch axis. This gave the pilot the impression that the aircraft was much more sensitive longitudinally than laterally with the SAS "off."

2.6.5.3 Qualitative Pilot's Comments on Directional Controllability

Clean and Armed Configurations

Directional controllability in hovering was sufficient to meet the requirements of MIL-H-8501A. A directional input in hovering resulted in a constant rate in the direction of the input with no coupling along the other axes. There did not appear to be any tendency of the residual yaw rate to either dampen or increase.

Directional control forces in a hover, as in other flight conditions, were considered heavy and not in harmony with the lateral or longitudinal control forces. This coupled with control system slop and nonuniform breakout forces to the right and left made holding a precision heading in hovering, particularly in gusty air, difficult.

The controllability in level flight did not appear to vary with any of the configurations tested, with the possible exception of the XM-7 configuration, which appeared slightly more sluggish. The controllability did appear to decrease with airspeed probably because of the increased damping. At low airspeeds on the back side of the power curve, stabilizing in heading was extremely difficult. A residual self-excited oscillation in yaw of 4 to 5 degrees was present and was difficult to stop.

A serious safety-of-flight implication was uncovered with the XM-7 configuration following a right pedal input at speeds approaching the maximum for level flight. A tucking occurred shortly after the control input with a divergent nose-down pitch rate. This same condition, although not so severe, was also apparent in the forward C.G., clean configuration tested (both design gross weight and overload gross weight).

The directional controllability in climb and autorotation did not appear to differ from the level flight case at the same airspeeds and configurations. In all configurations tested, directional controllability was satisfactory. In one case, which could not be duplicated under test conditions, at a high rate of descent (1500 feet per minute [fpm]) and at approximately 100 KCAS in a descending right hand turn, a sudden apparent loss of directional control power was noted by the pilot. This condition could not be repeated under instrumented conditions.

2.6.6 COMPARISON OF THE CONTROLLABILITY OF THE OH-5A AND THE OH-13H AND OH-23D

The OH-5A with the exception of the control coupling shortcomings explained previously, exhibited controllability characteristics superior to those of either the OH-13H or the OH-23D. The control coupling shortcomings of the OH-5A,however are not meant to be minimized, as neither the OH-13H nor the OH-23D exhibited safety-of-flight controllability shortcomings comparable to those observed on the OH-5A. The response and sensitivity of the OH-5A with the OH-13H and the OH-23D are compared in Figures F and G (See following pages).

Comparing the tabulated values for the response and sensitivity, it is apparent that in all cases, these values for the OH-5A are higher than or comparable to those of the OH-13H or OH-23D and the times to reach these values are shorter than those for either the OH-13H or OH-23D.

FIGURE F

COMPARISON OF CONTROL SENSITIVITY

Aircraft	Approximate Density Altitude ~ feet	Approximate Gross Weight ~ pounds	Rotor Revolutions Per Minute (rpm)	Approximate Center of Gravity ~ inches
OH-5A	5000	2700	368	101.4 (aft)(SAS "on" & "off")
OH-13H	5000	2500	344	85 (mid)
OH-23D	5000	2500	355	82.7 (mid)

		PITCH				ROLL				YAW			
		Angular Acceleration ~deg/sec²/in		Time to Maximum Acceleration ~sec		Angular Acceleration ~ deg/sec²/in		Time to Maximum Acceleration ~sec		Angular Acceleration ~ deg/sec²/in		Time to Maximum Acceleration ~sec	
Aircraft	Airspeed ~kt.(CAS)	Up	Down	Up	Down	Right	Left	Right	Left	Right	Left	Right	Left
OH-5A (SAS "on")	Hover(IGE)	12	13	.30	.30	29	27	.3	.3	51	46	.5	.5
OH-5A (SAS "on")	92	12	13	.30	.30	42	33	.3	.3	51	46	.5	.5
OH-5A (SAS "off")	78	9.5	8.5	.50	.50	28	32	.3	.3	-	-	-	-
OH-13H	Hover(IGE)	10	12	.43	.43	16	15	.33	.33	25	35	.47	.47
	65	15	16	1.05	1.05	17.5	16.5	.36	.36	23	25	-	-
OH-23D	69	13.5	14	.64	.64	25	27	.31	.31	49	49	.28	.28

FIGURE G

COMPARISON OF CONTROL RESPONSE

Aircraft	Approximate Density Altitude ~ feet	Approximate Gross Weight ~ pounds	Rotor Revolutions Per Minute (rpm)	Approximate Center of Gravity ~ inches
OH-5A	5000	2700	368	101.4(aft)(SAS "on" & "off")
OH-13H	5000	2500	344	85 (mid)
OH-23D	5000	2500	355	82.7(mid)

		PITCH				ROLL				YAW			
		Response ~deg/sec/in		Time to Maximum Rate ~ sec		Response ~deg/sec/in		Time to Maximum Rate ~ sec		Response ~deg/sec/in		Time to Maximum Rate ~ sec	
Aircraft	Airspeed ~kt.(CAS)	Up	Down	Up	Down	Right	Left	Right	Left	Right	Left	Right	Left
OH-5A(SAS"on")	Hover(IGE)	6	6	.6	.6	13	9	.70	.70	43	30	Read at 1 sec	
OH-5A(SAS"on")	92	6	6	.6	.6	13	11.5	.70	.70	19	19	1.0	1.0
OH-5A(SAS"off")	78	10	10	2.0	2.0	17	17	1.0	1.0	-	-	-	-
OH-13H	Hover(IGE)	6.5	6.5	1.96	1.96	7.5	8.0	.86	.86	28	33	Read at 1 sec	
	65	6	6	1.05	1.05	7	8	.98	.98	9	10	.87	.87
OH-23D	69	17.5	11	1.51	1.51	10	11	.69	.69	19	24	.86	.86

2.7 ARMAMENT FIRINGS

2.7.1 OBJECTIVE

The objective of the tests was to determine the effect of the armament on the basic helicopter stability and control during a firing sequence. Additional firing tests were conducted to evaluate the SAS contribution to the flying qualities.

2. . METHOD

The effect of the armament was obtained by recording the aircraft motions that resulted from a firing sequence. The firings were conducted from a stabilized condition and the firing sequence was normally 2 to 4 seconds in duration. The aircraft was allowed to respond freely to the inputs from the armament. All control positions, aircraft attitudes and rates were recorded for each firing. Tests were conducted with both the XM-7 and XM-8 at a forward C.G. and design gross weight for the following flight conditions:

a. Hover

b. Left Sideward Flight

c. Level Flight at 35 KCAS, .8 V_{MAX} and V_{MAX}

d. Rolling pullout to the right at V_{MAX}

2.7.3 RESULTS

Time histories illustrating the helicopter response during the firings are presented in Figures No. 195 through 198, Section 3, Appendix I.

2.7.4 ANALYSIS

2.7.4.1 Quantitative Engineering Analysis of Armament Firings

Armament firings were conducted with the OH-5A equipped with the XM-7 or XM-8 armament systems. Firing with the XM-7 at high airspeeds with the SAS "off", resulted in a rather severe tucking. This tucking could be corrected by the pilot but required careful attention. With the SAS "on", there were no controllability problems in either hovering or any forward speed up to the power available maximum for level flight.

There were no controllability problems associated with firing the XM-8. The vibration and noise levels of the aircraft increased significantly during firing of the XM-8.

For both weapon systems, from a controllability viewpoint, the most critical gun elevation angle was in a full-up position.

2.7.5 QUALITATIVE PILOT'S COMMENTS ON ARMAMENT FIRINGS

There were no controllability problems associated with firing either the XM-7 or XM-8 with the SAS "on." With the SAS "off" and the XM-7 installed, the stability deficiencies for this configuration previously noted, became apparent. The firing of the weapon caused the aircraft to enter a sideslip which, in turn, resulted in a nose-down pitching tendency. At high speeds, this pitching tendency was quite pronounced and objectionable.

2.8 AUTOROTATIONAL CHARACTERISTICS

2.8.1 OBJECTIVE

The objective of the autorotational entry tests was to investigate quantitatively the trim change and the control inputs required to stabilize the helicopter in the event of a sudden loss in engine power.

2.8.2 METHOD

The autorotational entries were performed by first stabilizing the aircraft at a trim condition, and then rapidly reducing power to enter autorotation. The collective pitch control trim position was maintained for at least 2 seconds after the power reduction. At this time, the collective control was lowered. All other flight controls were held in the trim position until the helicopter was in stabilized autorotation or until corrective action was necessary. Control positions, aircraft attitudes and rates were recorded for each autorotational entry. The tests were conducted at airspeeds ranging from 35 knots calibrated airspeed (KCAS) to V_{MAX}.

2.8.3 RESULTS

A time history of a throttle chop is presented in Figure No. 199, Section 3, Appendix I.

2.8.4 ANALYSIS

2.8.4.1 Quantitative Engineering Analysis of the Autorotational Characteristics

Clean and Armed Configuration

Autorotational entries in the clean configuration were

characterized by a mild left yaw and pitch-up. Control was positive throughout the entry. The rotor rpm decay was acceptable and allowed a 2 to 4 second delay in lowering collective pitch before minimum rotor rpm was reached. The rotor rpm buildup rate was high and would exceed limits if not monitored during autorotational entries. This characteristic was more critical at high gross weights or high altitudes. The rotor rpm was easy to stabilize. Random hunting in yaw of 2 to 4 degrees occurred during an autorotational entry.

2.8.5 QUALITATIVE PILOT'S COMMENTS ON AUTOROTATIONAL CHARACTERISTICS

Clean and Armed Configuration

Attitude and visibility were acceptable in autorotation.

Engine response to power recoveries from autorotation was unacceptable. During the program, several unintentional autorotational landings were made when the engine failed to respond to the collective pitch requirements. These landings were characterized by excessive yaw and the rotor rpm approaching the minimum limit.

The autorotational characteristics with the XM-8 installed were similar to those of the clean configuration. With the XM-7 installed, objectionable hunting occurred in both yaw and pitch and it was difficult to stabilize the aircraft.

2.8.6 COMPARISON OF THE AUTOROTATIONAL CHARACTERISTICS OF THE OH-5A AND THE OH-13H AND OH-23D

Data not available for comparison.

2.9 FLIGHT CONTROL SYSTEM EVALUATION

2.9.1 OBJECTIVE

The objective of this test was to evaluate quantitatively the characteristics of the flight control system.

2.9.2 METHOD

The variation of pilot's longitudinal control position with change in attitude of the aircraft due to SAS operation was found by varying the attitude of the gyro horizon and measuring the change in the control stop positions.

Control breakout forces were measured on the ground with the rotor stationary and hydraulic pressure supplied from an

external source. The friction was turned off for all measurments.

2.9.3 RESULTS

The results of these tests are summarized in Figure No. 200 and 201, Section 3, Appendix I.

2.9.4 ANALYSIS

2.9.4.1 <u>Quantitative Engineering Analysis of the Flight Control System</u>

The static stop on the longitudinal cyclic control was on the swashplate side of the SAS actuator. Because the SAS sensed aircraft attitude and rate, the control stop moved as a function of pitch attitude and rate. This was objectionable because the pilot loses feel for how far the cyclic control is from the stop. This was particularly objectionable in a transient pitching motion where the static stop and control motions are moving in converging directions. How the longitudinal cyclic control stops moved as a function of pitch attitude is illustrated in Figure No. 200, Section 3, Appendix I. The SAS system on the OH-5A's used for this evaluation were very unreliable. The artificial horizon sensor was replaced seven times on the three aircraft used during this evaluation.

No SAS hardover tests were conducted because no SAS hardover control was available.

Simulated control hydraulic boost failures were not tested because no boost cut-off was available.

The following table summarizes the control breakout forces for the OH-5A:

Control	MIL-H-8501A Requirement Minimum ~ Pounds	Maximum	OH-5A Pounds
Longitudinal	0.5	1.5	2.0 aft - 1.5 fwd
Lateral	0.5	1.5	1.4 rt - 0.8 left
Directional	3.0	7.0	5.5 rt - 7.0 left
Collective	1.0	3.0	2.5

As can be seen from the table all breakout forces were within the limits of MIL-H-8501A, except for the aft longitudinal breakout force, which was not objectionable. The difference in breakout force between the right and left pedal was objectionable, and, although within the limits of MIL-H-8501A, the pedal breakout forces were considered objectionably high.

2.10 AIRSPEED CALIBRATION

2.10.1 OBJECTIVE

The objective of this test was to determine the airspeed position error for the test airspeed system.

2.10.2 METHOD

The airspeed calibration of the test system was determined by using the pacer calibration method. Aircraft OH-5A, SN 62-4209 was calibrated using an OH-4A as a pacer and aircraft OH-5A, SN 62-4210, was calibrated using an OH-6A as a pacer. Both pace aircraft had calibrated test systems. The systems were calibrated from 15 to 115 KIAS with approximately 10 knot airspeed increments. The tests were conducted at a density altitude of 5000 feet, a gross weight of 2600 pounds, a 368 rotor rpm (average), and in the clean configuration.

2.10.3 RESULTS

Graphical test results are presented in Figure No. 202, Section 3, Appendix I.

2.10.4 ANALYSIS

2.10.4.1 Quantitative Engineering Analysis of Airspeed Calibration

The test system indicated identical position errors for both aircraft. In both cases, the change in position error was linear and increased with indicated airspeed. Instrumentation difficulties prevented calibration of the ship system.

SECTION 3 - APPENDICES

APPENDIX I - TEST DATA

FIGURE No. 1

SUMMARY OF CONTROL POSITIONS IN FORWARD FLIGHT

OH-5A USA S/N 62-4209 & 10.

SYM.	AVG. GW ~LB~	AVG. H_p ~FT~	AVG. LONG. C.G. ~IN~	AVG. LAT C.G ~IN~	CONFIGURATION	SAS COND
○	2590	6600	101.3 (AFT)	0.2 LT	CLEAN	ON
▽	2610	6700	101.3 (AFT)	0.2 LT	CLEAN	OFF
□	2680	5200	95.6 (FWD)	0.2 LT	CLEAN	ON
△	3040	5110	101.9 (AFT)	0.2 LT	CLEAN	ON
◇	2690	10300	101.4 (AFT)	0.2 LT	CLEAN	ON
◁	2710	5600	101.0 (AFT)	1.1 LT	XM-7 STOWED	ON
⊖	2710	5400	101.1 (AFT)	0.3 RT	XM-8 STOWED	ON

POINTS DERIVED FROM FIGURE NOS. 2 THROUGH 4

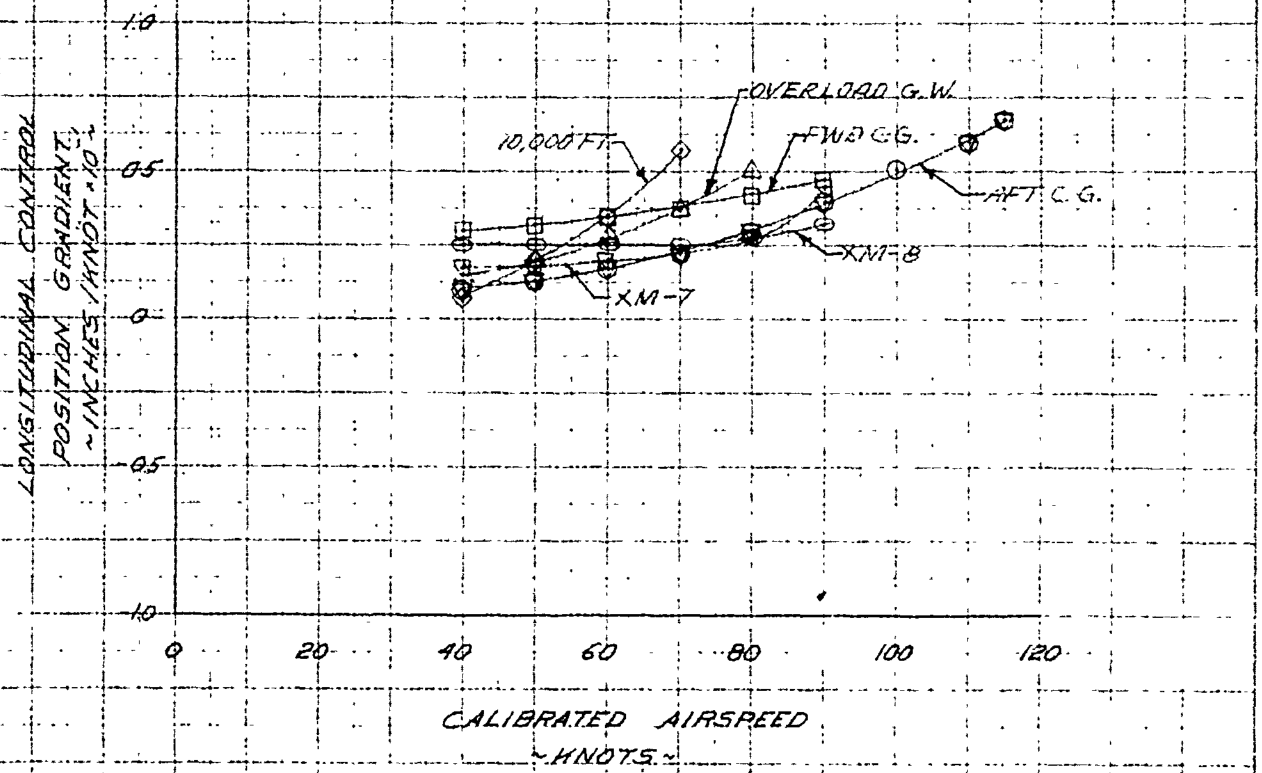


FIGURE No. 2

CONTROL POSITIONS IN FORWARD FLIGHT

OH-5A USA S/N 62-4209

SYM	AVG. GW ~LB~	AVG CG ~IN~ LONG	AVG CG ~IN~ LAT	AVG. H_D ~FT	ROTOR RPM	CONFIGURATION	
○	2590	101.3(AFT)	0.2(LT)	6600	368	CLEAN	SAS ON
□	2610	101.3(AFT)	0.2(LT)	6700	368	CLEAN	SAS OFF
△	2680	95.6(FWD)	0.2(LT)	5200	368	CLEAN	SAS ON

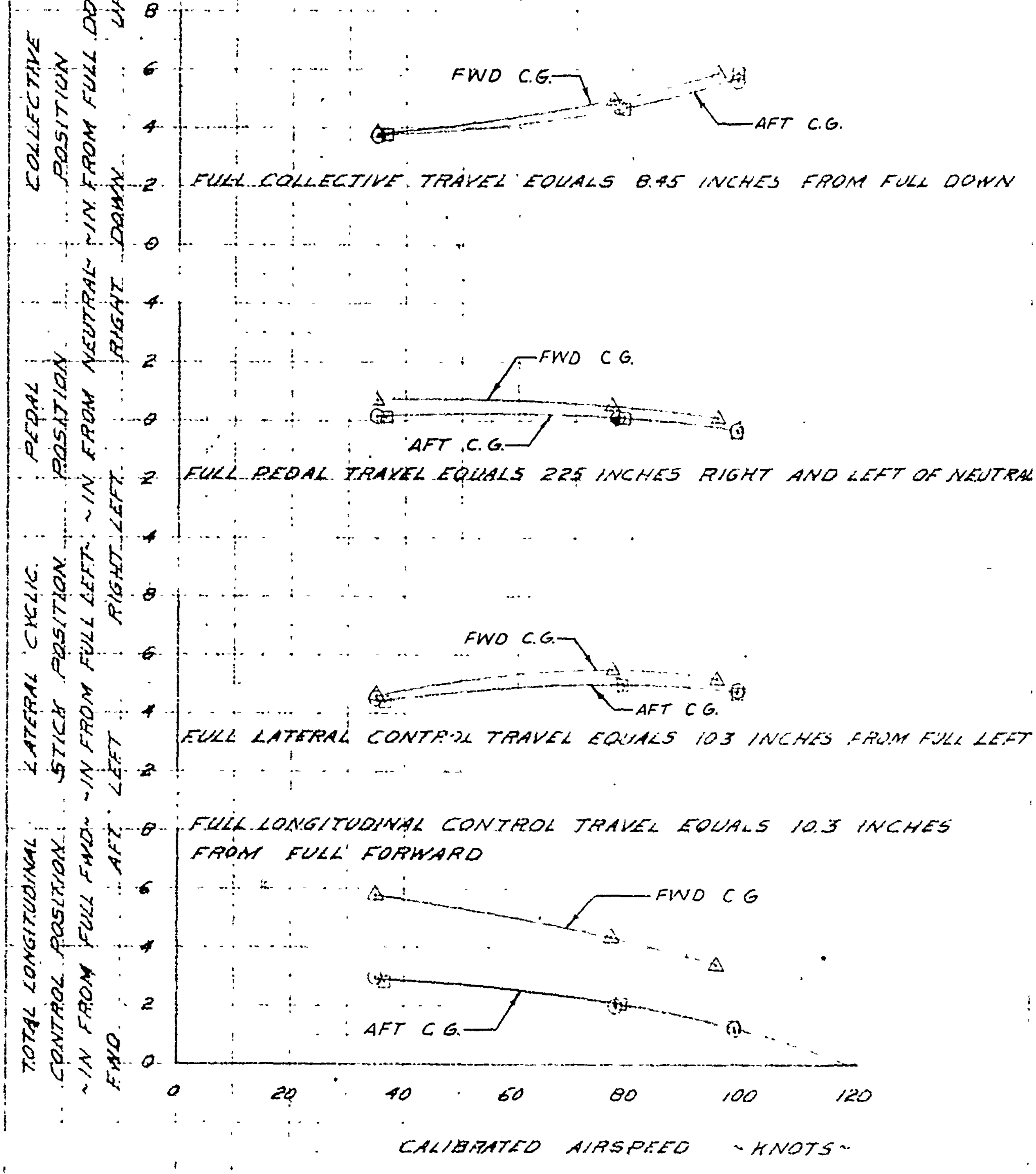
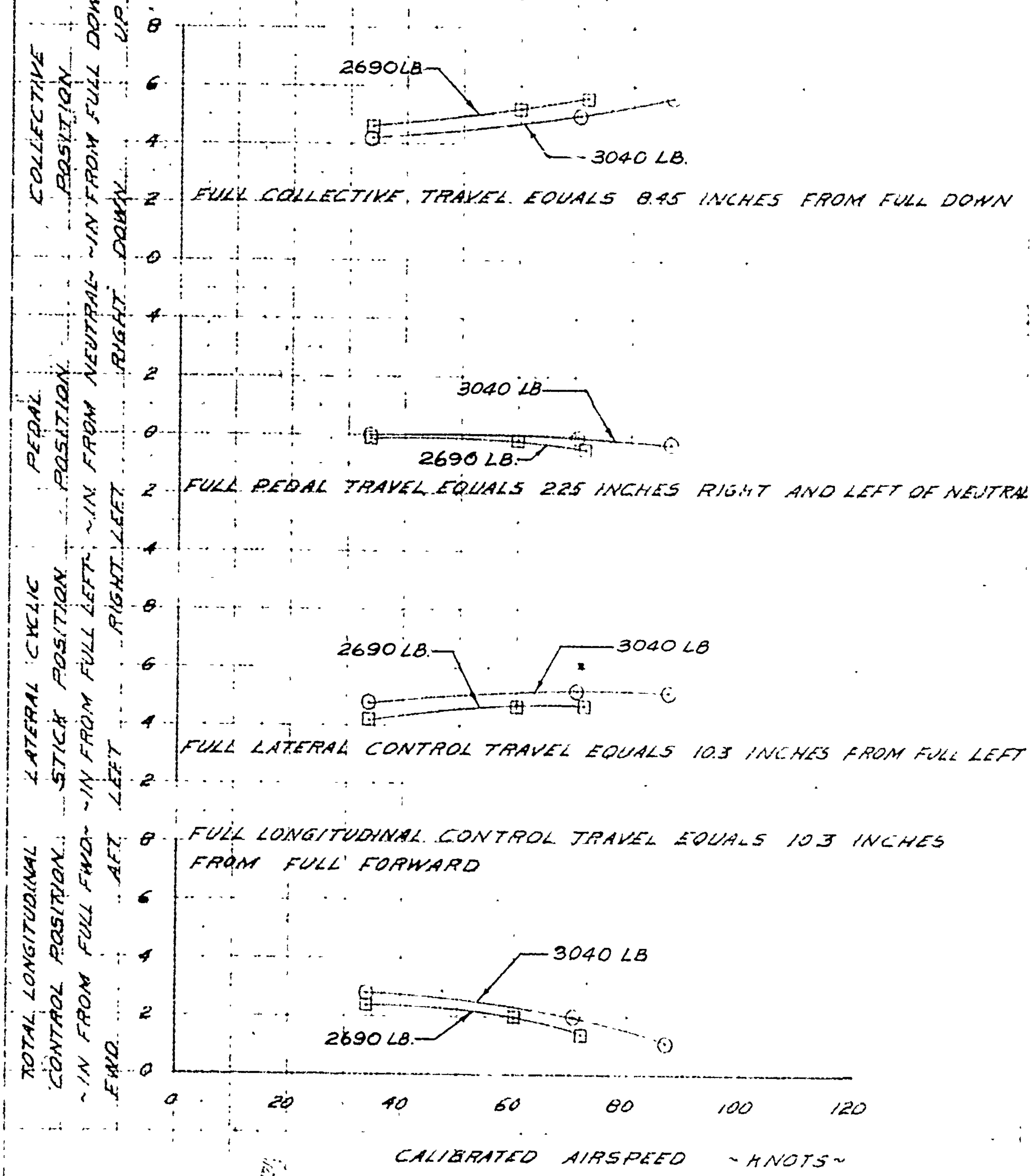


FIGURE No. 3

CONTROL POSITIONS IN FORWARD FLIGHT

OH-5A USA S/N 62-4209

SYM	AVG. GW ~LB~	AVG. C.G. ~IN~ LONG	AVG. C.G. ~IN~ LAT	AVG. H_D ~FT.	ROTOR RPM	CONFIGURATION	
○	3040	101.9(AFT)	0.2 (LT)	5110	368	CLEAN	SAS ON
□	2690	101.4(AFT)	0.2 (LT)	10300	368	CLEAN	SAS ON



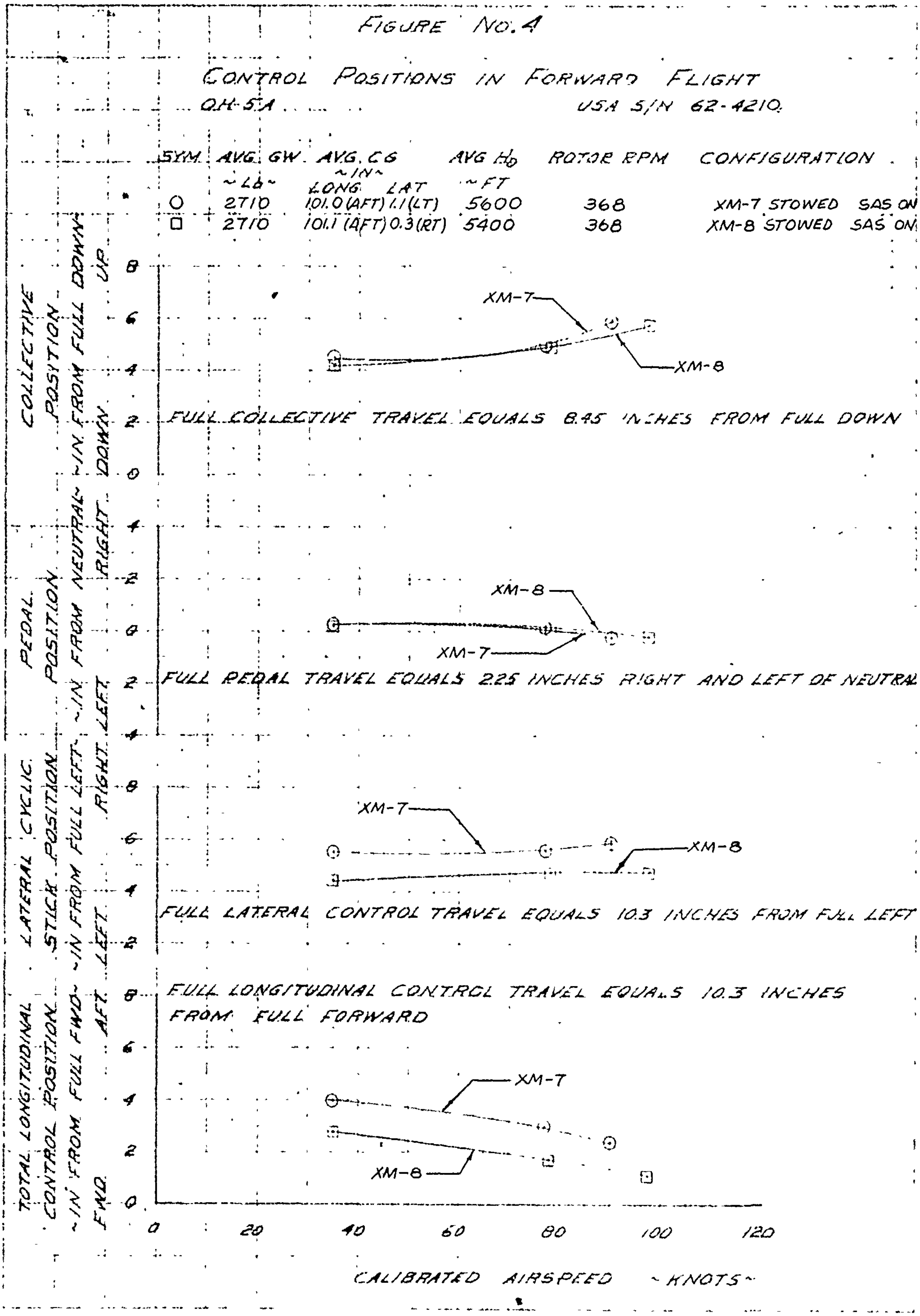


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FIGURE No. 5

STATIC LONGITUDINAL COLLECTIVE FIXED STABILITY SUMMARY

OH-5A USA S/N 62-4209 & 10

SYM	AVG. G.W. ~ LB	AVG. H_D ~ FT	AVG C.G ~ IN LONG	LAT	CONFIGURATION	SAS CONDITION
⊖	2650	5260	101.3 (AFT)	0.2 (LT)	CLEAN	ON
⊡	2660	5940	95.5 (FWD)	0.2 (LT)	CLEAN	ON
⊕	2600	10150	101.4 (AFT)	0.2 (LT)	CLEAN	ON
△	2930	6420	101.3 (AFT)	0.2 (LT)	CLEAN	ON
◇	2620	5800	101.1 (AFT)	1.1 (LT)	XM-7 STOWED	ON
⊽	2690	5700	101.1 (AFT)	0.3 (RT)	XM-8 STOWED	ON
▽	2610	6700	101.3 (AFT)	0.2 (LT)	CLEAN	OFF
D	2520	10000	101.3 (AFT)	0.2 (LT)	CLEAN	OFF

NOTE:
1. FLAGGED SYMBOLS DENOTE AUTOROTATION
2. SHADED SYMBOLS DENOTE CLIMB

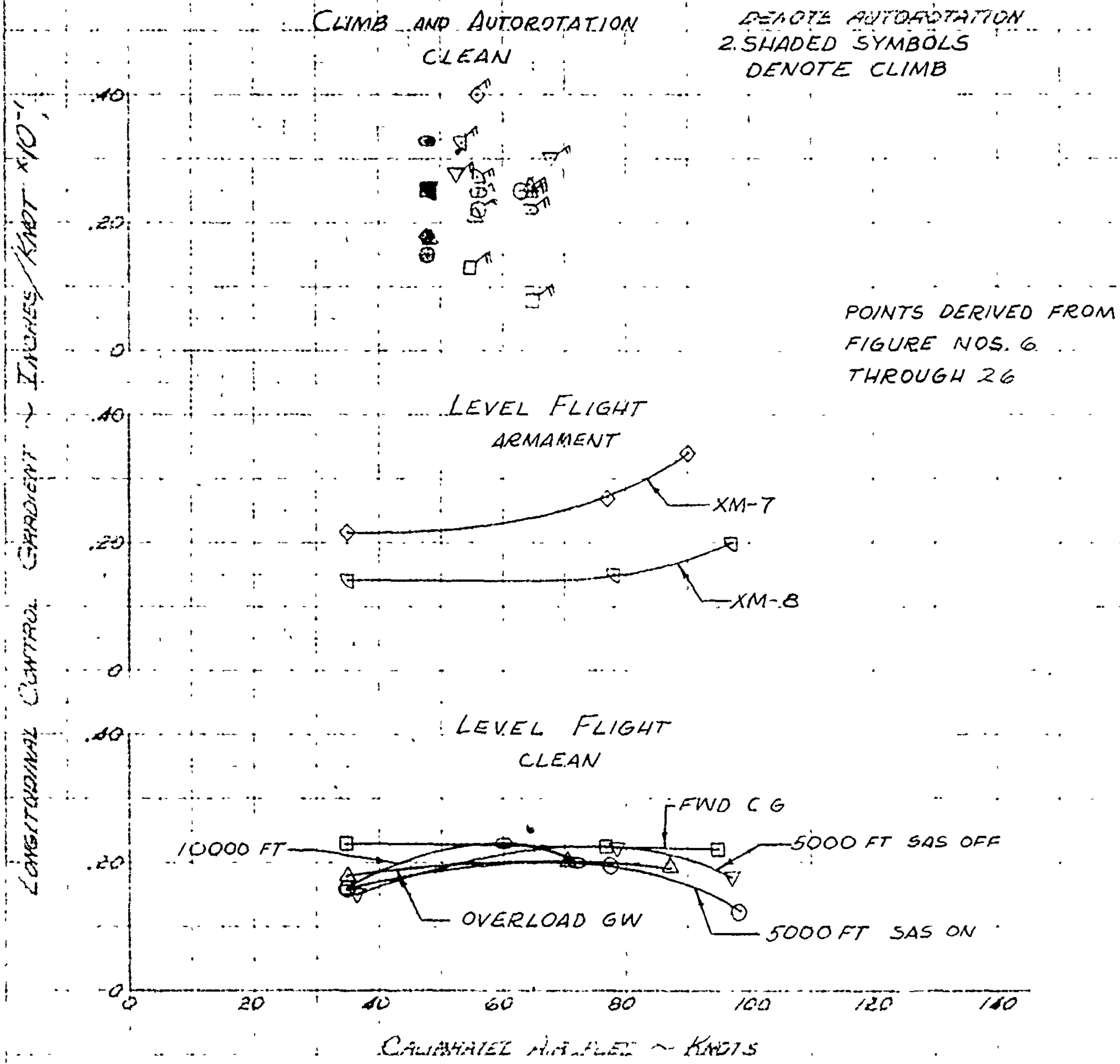

FIGURE NO. 6

STATIC LONGITUDINAL COLLECTIVE FIXED STABILITY

OH-5A USA S/N 62-4209

LEVEL FLIGHT

SYM	CAS @ TRIM ~KNOTS~	AVG GW ~Lb~	AVG CG LONG ~INCHES~	AVG CG LAT ~INCHES~	AVG H_o ~FT~	ROTOR RPM	CONFIGURATION
○	35	2580	101.3(AFT)	0.2(LT)	6600	368	CLEAN
□	77.5	2580	101.3(AFT)	0.2(LT)	6700	368	CLEAN
△	98.5	2600	101.3(AFT)	0.2(LT)	6400	368	CLEAN

SAS ON

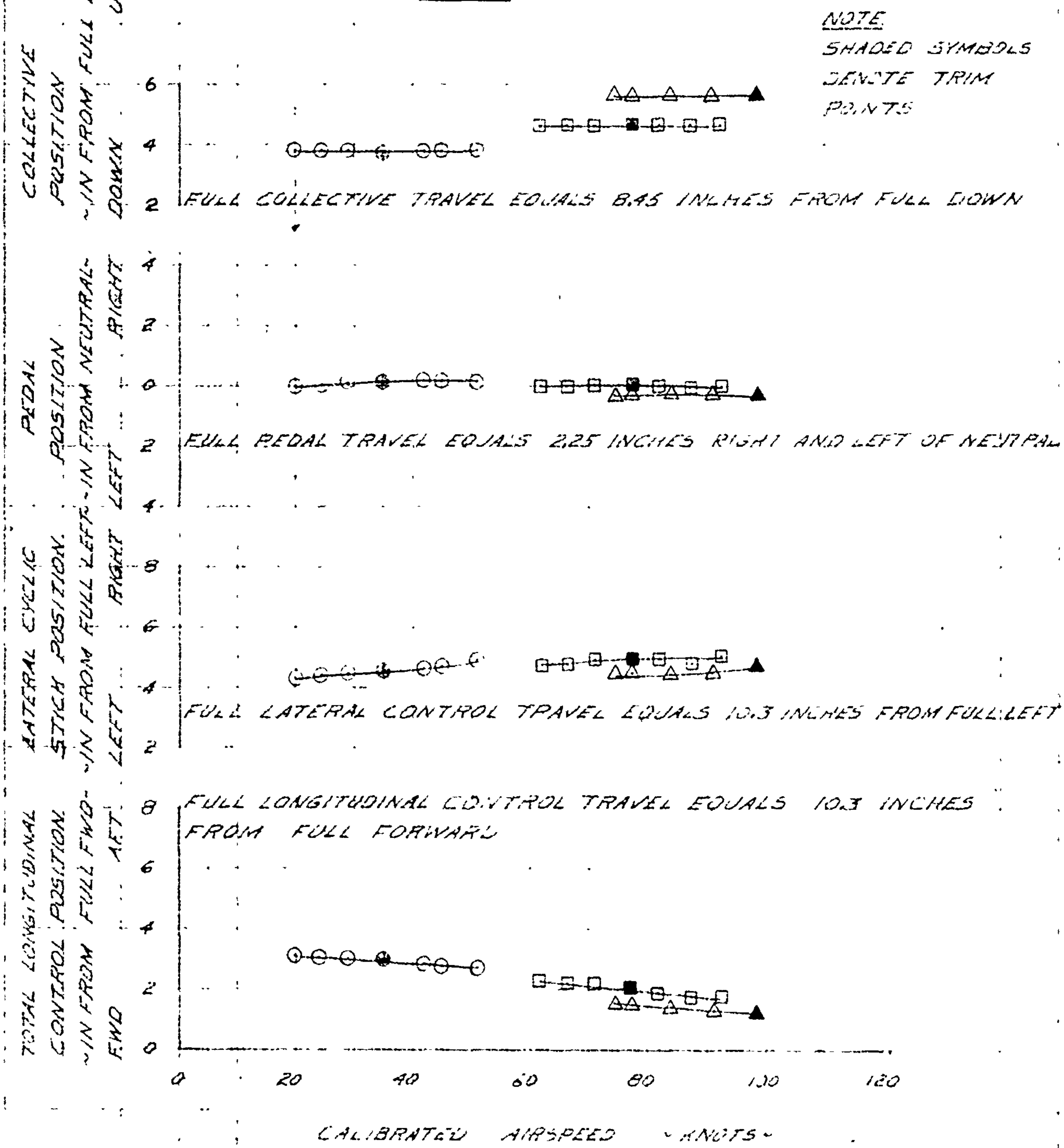

FIGURE No. 7

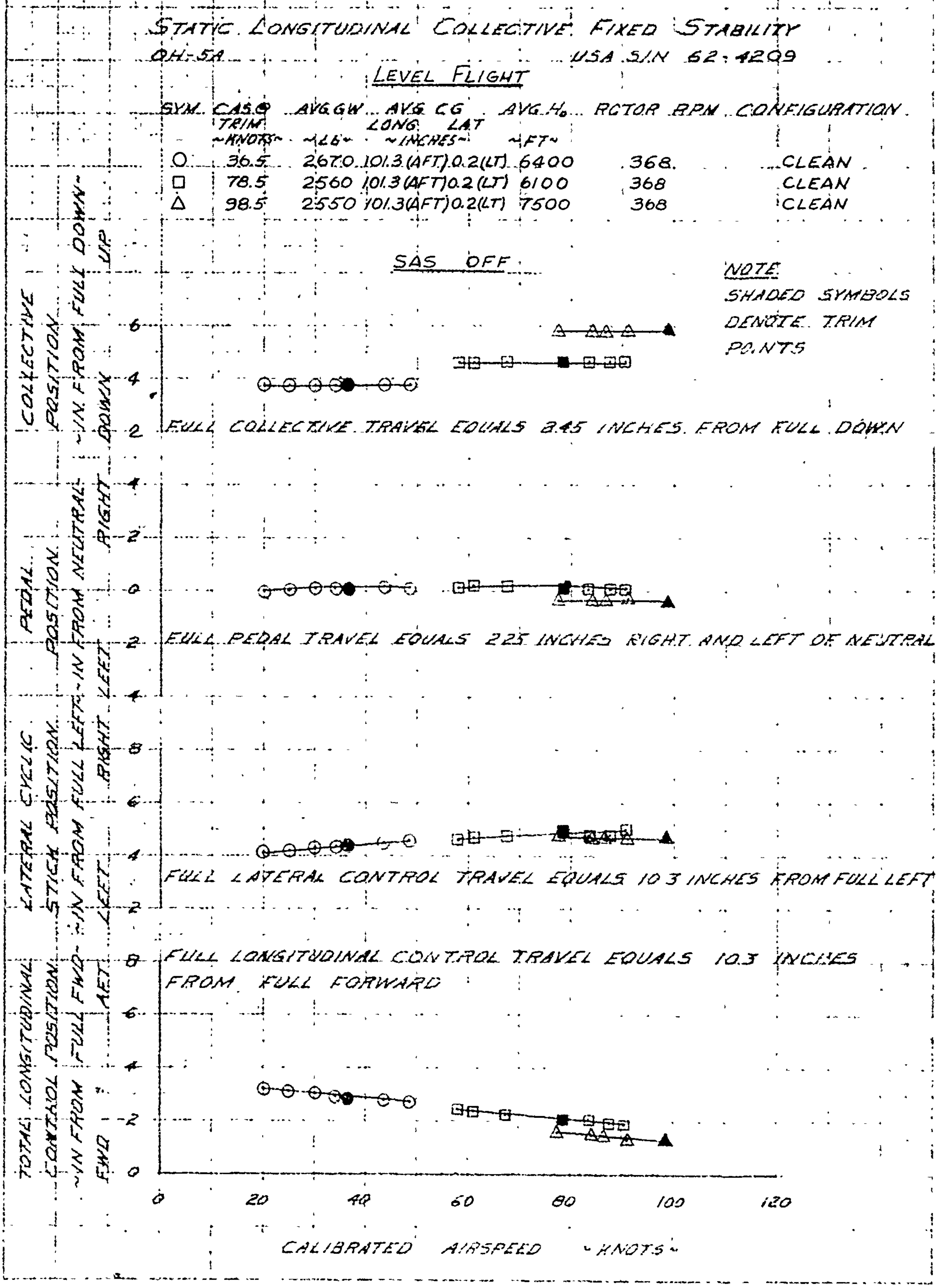

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FIGURE NO. 8

STATIC LONGITUDINAL COLLECTIVE FIXED STABILITY

OH-5A USA S/N. 62-4209

CLIMB (MAX CONT POWER)

SYM	CAS @ TRIM ~KNOTS~	AVG.GW ~LB~	AVG CG LONG ~INCHES~	AVG CG LAT ~INCHES~	AVG H_o ~FT~	ROTOR RPM	CONFIGURATION
○	48	2740	101.4 (AFT)	0.2 (LT)	5000	368	CLEAN

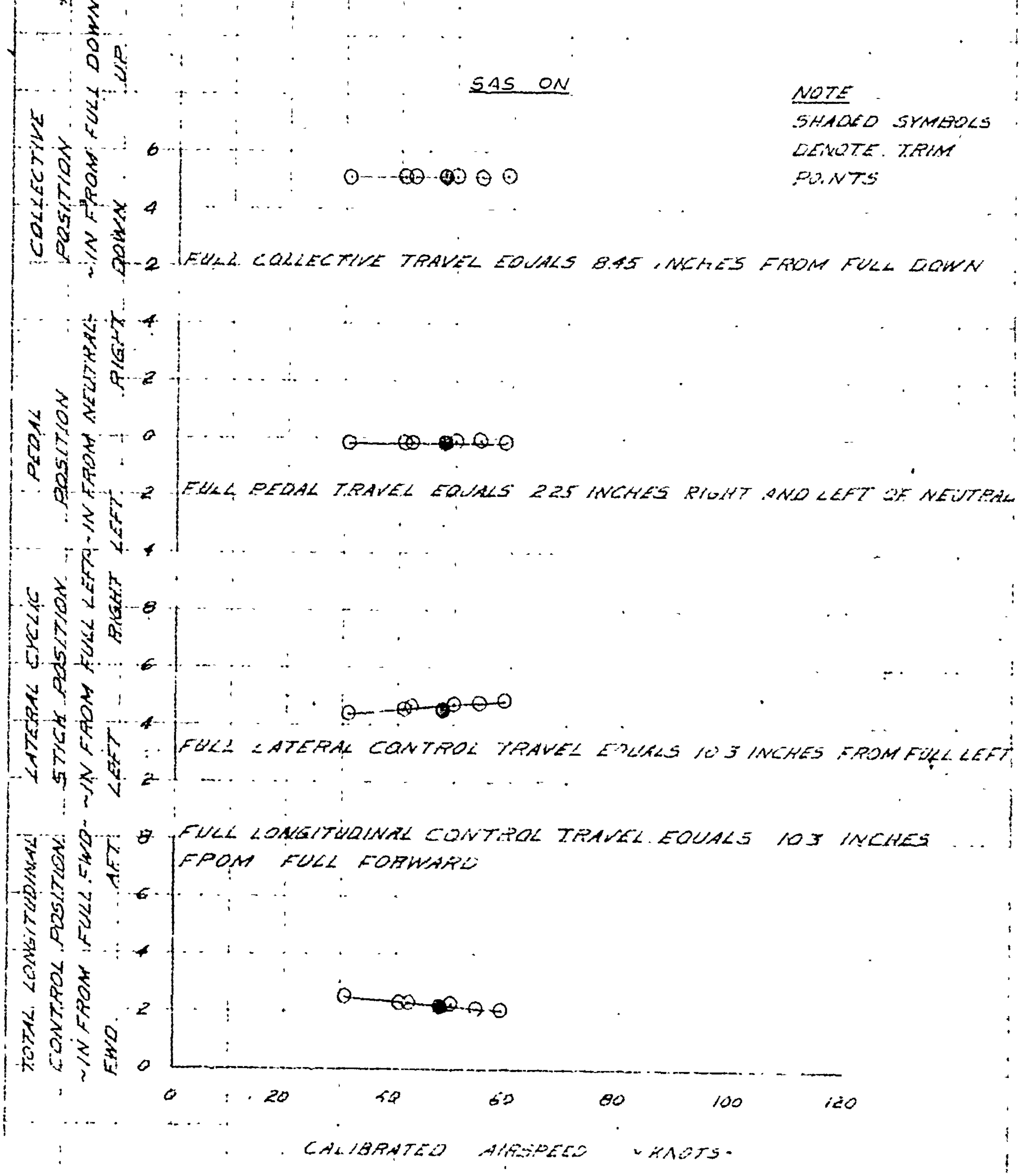


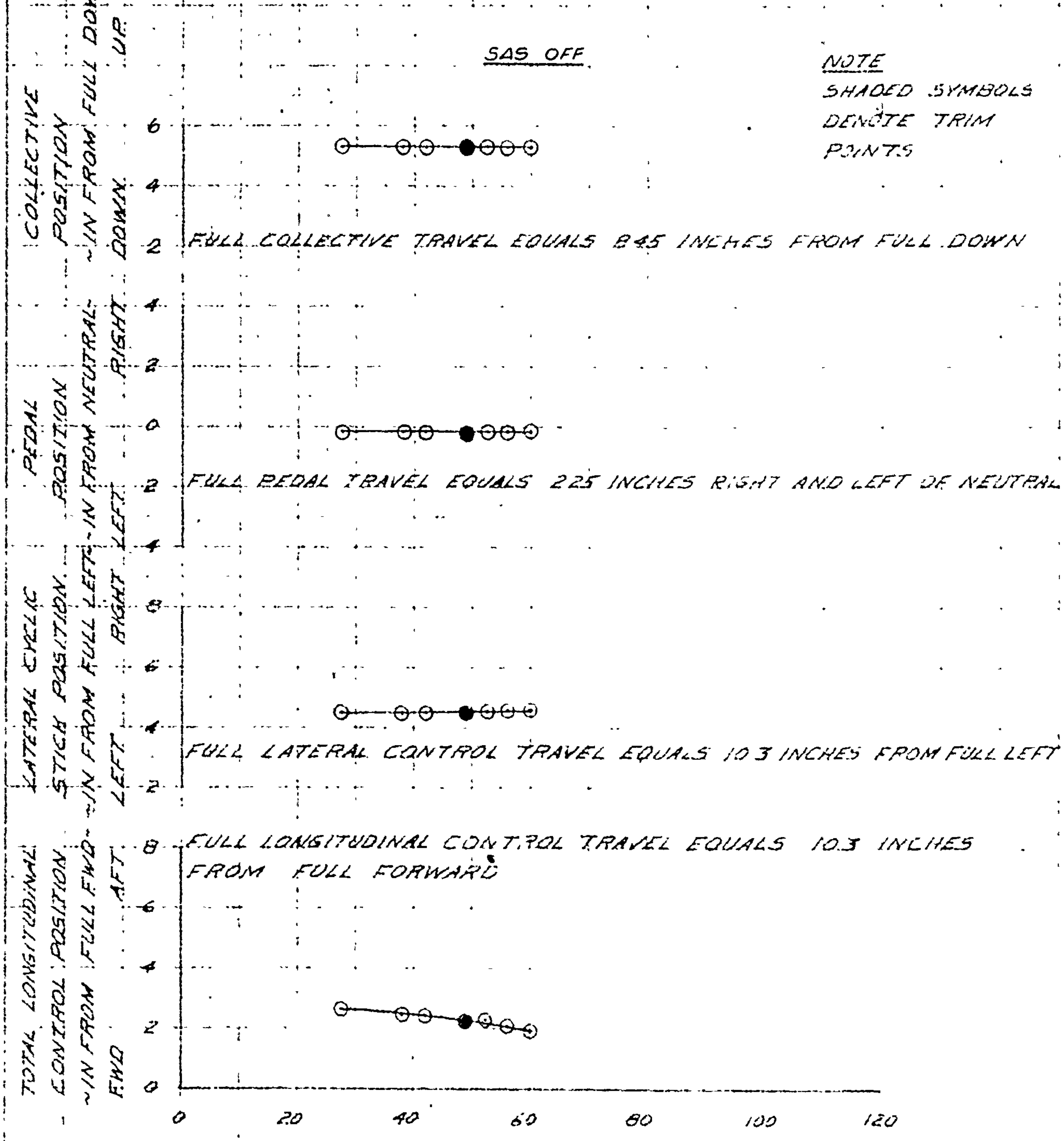
FIGURE NO. 9

STATIC LONGITUDINAL COLLECTIVE FIXED STABILITY

OH-5A USA S/N 62-4209

CLIMB (MAX CONT. POWER)

SYM	CAS @ TRIM ~KNOTS~	AVG GW. ~LB~	AVG CG. LONG ~INCHES~	AVG CG. LAT ~INCHES~	AVG H_o ~FT~	ROTOR RPM	CONFIGURATION
O	49	2700	101.4 (AFT)	0.2 (LT)	5000	368	CLEAN



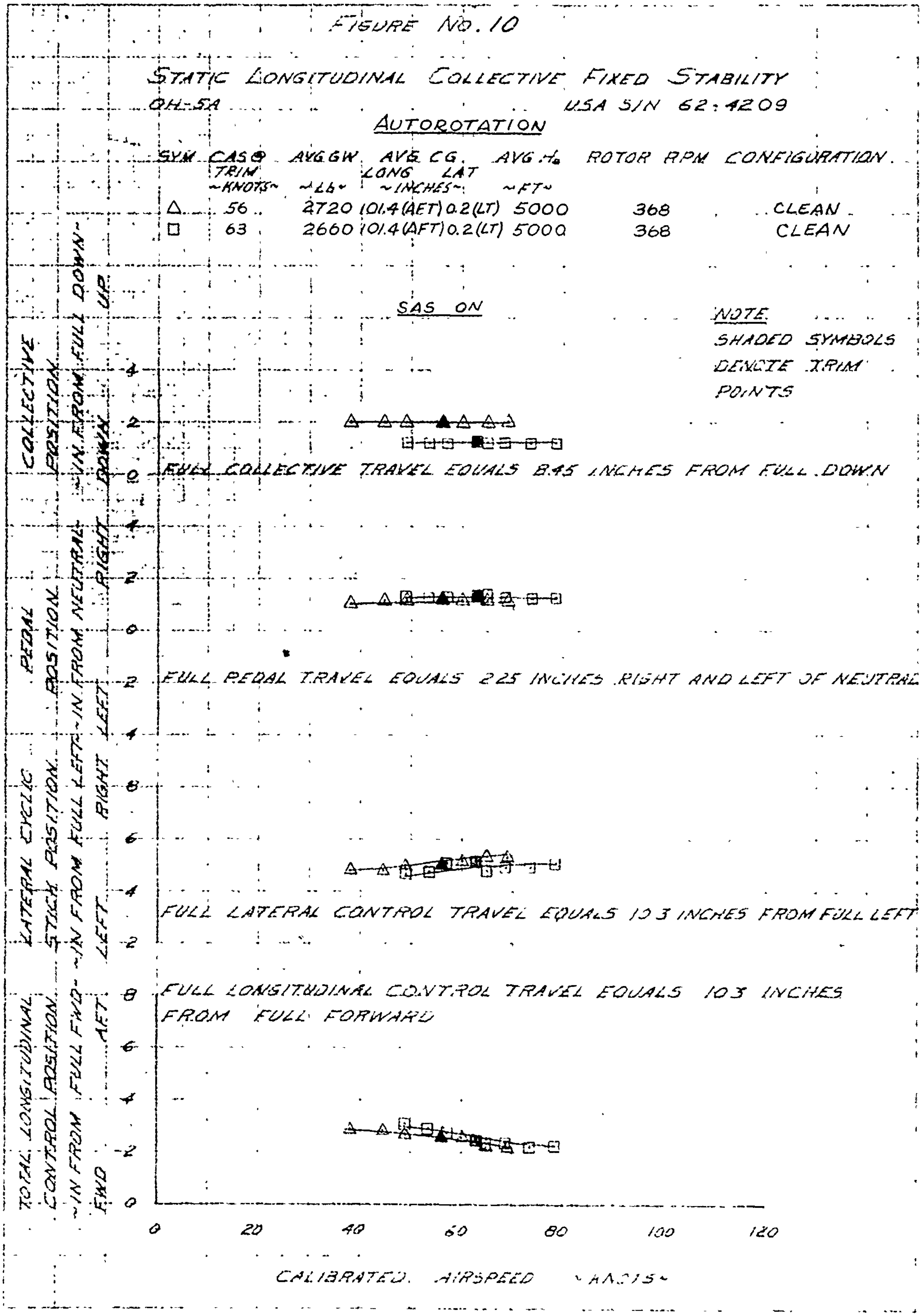


FIGURE NO. 10
STATIC LONGITUDINAL COLLECTIVE FIXED STABILITY
OH-5A
USA S/N 62-4209
AUTOROTATION
SYM
CAS @ TRIM ~KNOTS~
AVG GW ~LB~
AVG CG. LONG LAT ~INCHES~
AVG H_o ~FT~
ROTOR RPM
CONFIGURATION.
△ 56 2720 101.4(AFT) 0.2(LT) 5000 368 CLEAN
□ 63 2660 101.4(AFT) 0.2(LT) 5000 368 CLEAN
SAS ON
NOTE: SHADED SYMBOLS DENOTE TRIM POINTS
COLLECTIVE POSITION ~IN. FROM FULL DOWN
UP
DOWN
FULL COLLECTIVE TRAVEL EQUALS 8.45 INCHES FROM FULL DOWN
PEDAL POSITION ~IN. FROM NEUTRAL
RIGHT
LEFT
FULL PEDAL TRAVEL EQUALS 2.25 INCHES RIGHT AND LEFT OF NEUTRAL
LATERAL CYCLIC STICK POSITION ~IN FROM FULL LEFT
RIGHT
LEFT
FULL LATERAL CONTROL TRAVEL EQUALS 10.3 INCHES FROM FULL LEFT
TOTAL LONGITUDINAL CONTROL POSITION ~IN FROM FULL FWD
AFT
FWD
FULL LONGITUDINAL CONTROL TRAVEL EQUALS 10.3 INCHES FROM FULL FORWARD
0 20 40 60 80 100 120
CALIBRATED AIRSPEED ~KNOTS~

FIGURE NO. 11

STATIC LONGITUDINAL COLLECTIVE FIXED STABILITY

OH-5A USA S/N. 62-4209

AUTOROTATION

SYM	CAS@ TRIM ~KNOTS~	AVG. GW ~LB~	AVG. CG LONG ~INCHES~	AVG. CG LAT ~INCHES~	AVG. H_o ~FT~	ROTOR RPM	CONFIGURATION
△	53.5	2690	101.4 (AFT)	0.2 (LT)	5000	368	CLEAN
□	67	2650	101.4 (AFT)	0.2 (LT)	5000	368	CLEAN

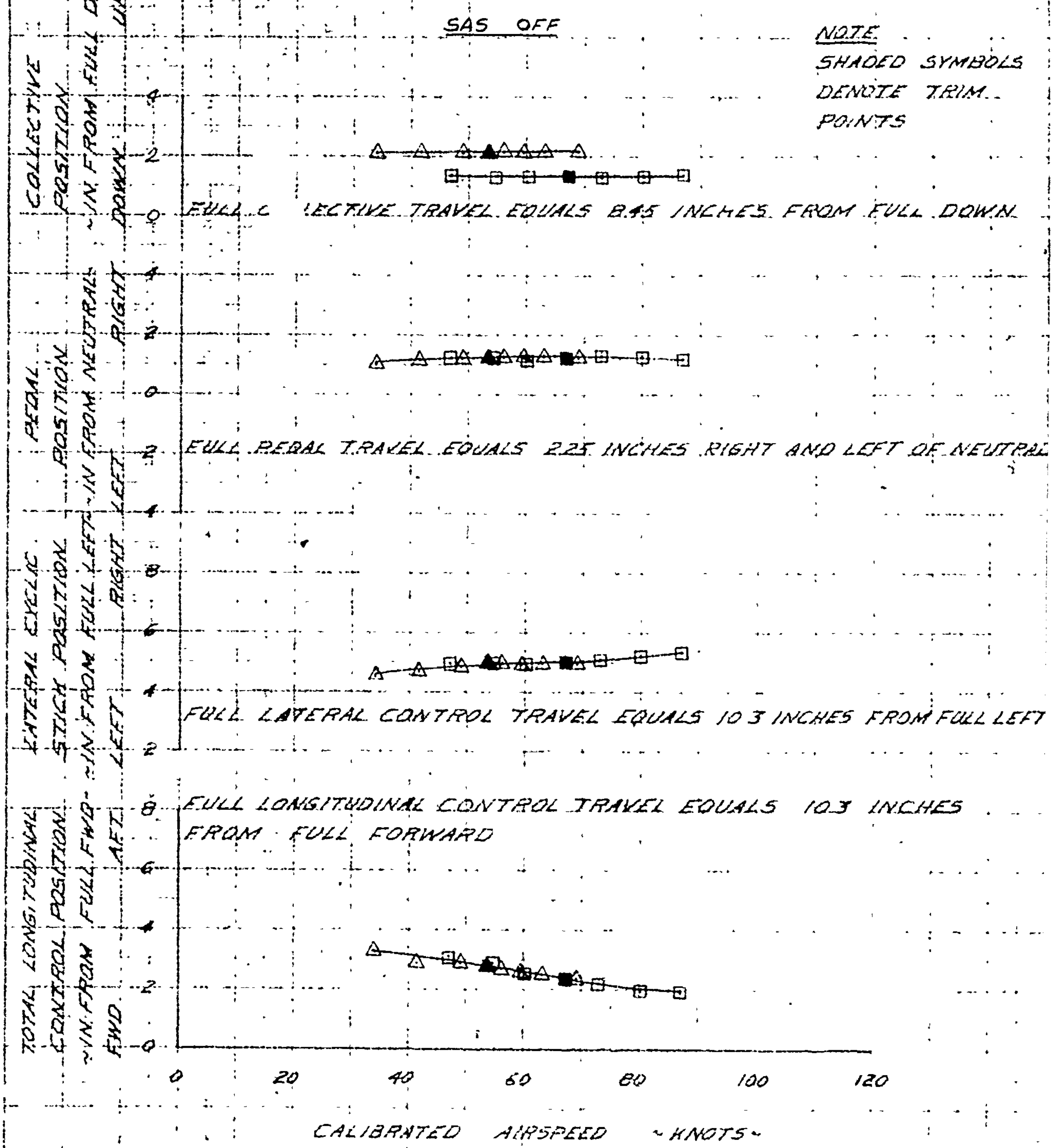


FIGURE No. 12

STATIC LONGITUDINAL COLLECTIVE FIXED STABILITY

OH-5A USA S/N. 62-4209

LEVEL FLIGHT

SYM	CAS@ TRIM ~KNOTS~	AVG.GW ~LB~	AVG. CG. LONG ~INCHES~	LAT	AVG. H_o ~FT~	ROTOR RPM	CONFIGURATION
○	35	2680	95.6(FWD)	0.2(LT)	4300	368	CLEAN
□	76.5	2690	95.6(FWD)	0.2(LT)	6400	368	CLEAN
△	95	2700	95.6(FWD)	0.2(LT)	6000	368	CLEAN

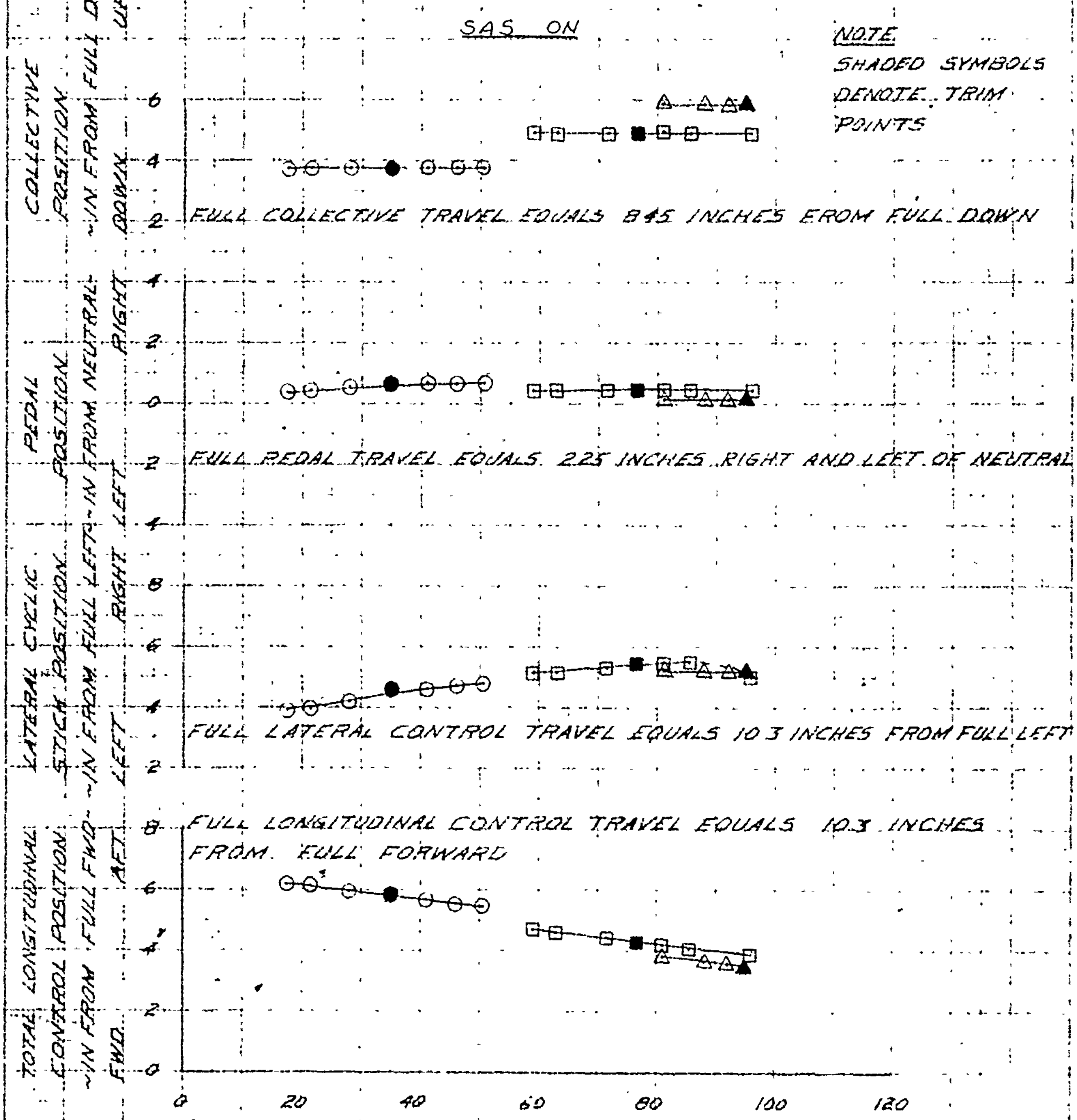


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FIGURE No. 13

STATIC LONGITUDINAL COLLECTIVE FIXED STABILITY

OH-5A USA S/N 62-4209

CLIMB (MAX. CONT POWER)

SYM.	CAS @ TRIM ~KNOTS~	AVG GW ~LB~	AVG CG LONG ~INCHES~	AVG CG LAT ~INCHES~	AVG H_p ~FT~	ROTOR RPM	CONFIGURATION
O	48	2660	95.3 (FWD)	0.2 (LT)	5000	368	CLEAN

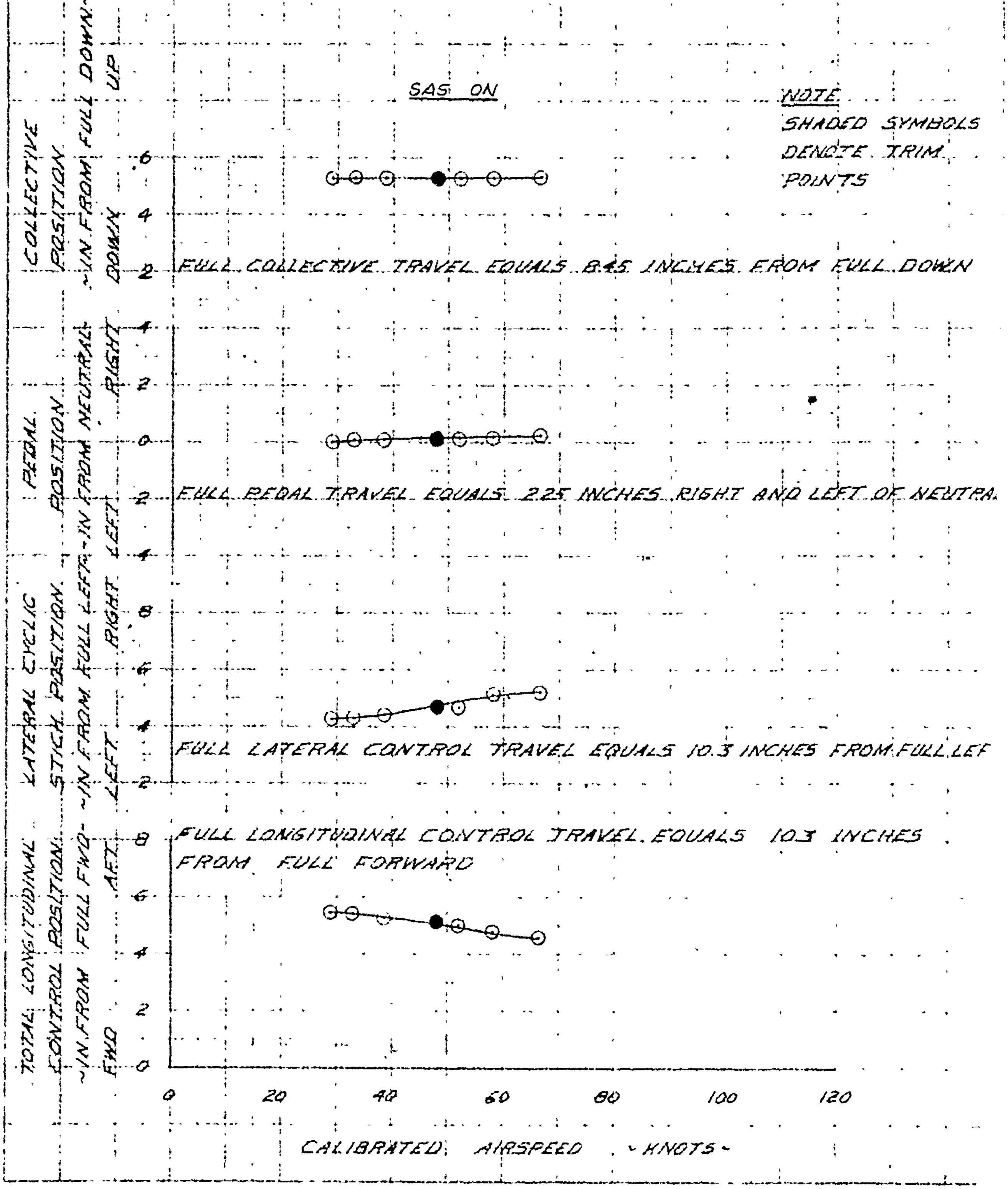

FIGURE No. 14

STATIC LONGITUDINAL COLLECTIVE FIXED STABILITY

OH-5A USA S/N 62-4209

AUTOROTATION

SYM	CAS @ TRIM ~KNOTS~	AVG.GW ~LB~	AVG. C.G. LONG ~INCHES~	AVG. C.G. LAT ~INCHES~	AVG H_o ~FT~	ROTOR RPM	CONFIGURATION
△	54.5	2600	95.3 (FWD)	0.2 (LT)	5000	368	CLEAN
□	65	2570	95.2 (FWD)	0.2 (LT)	5000	368	CLEAN

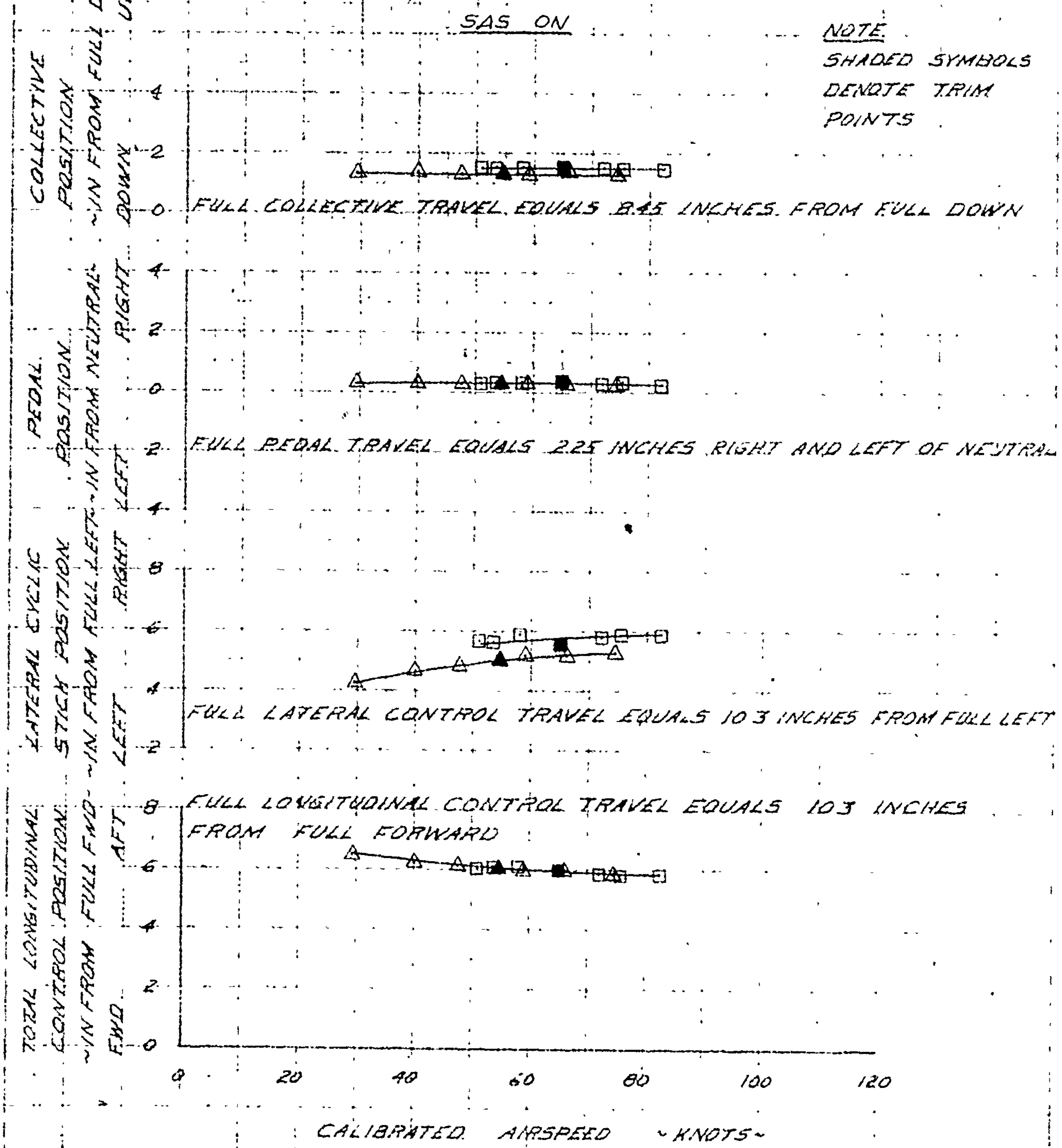

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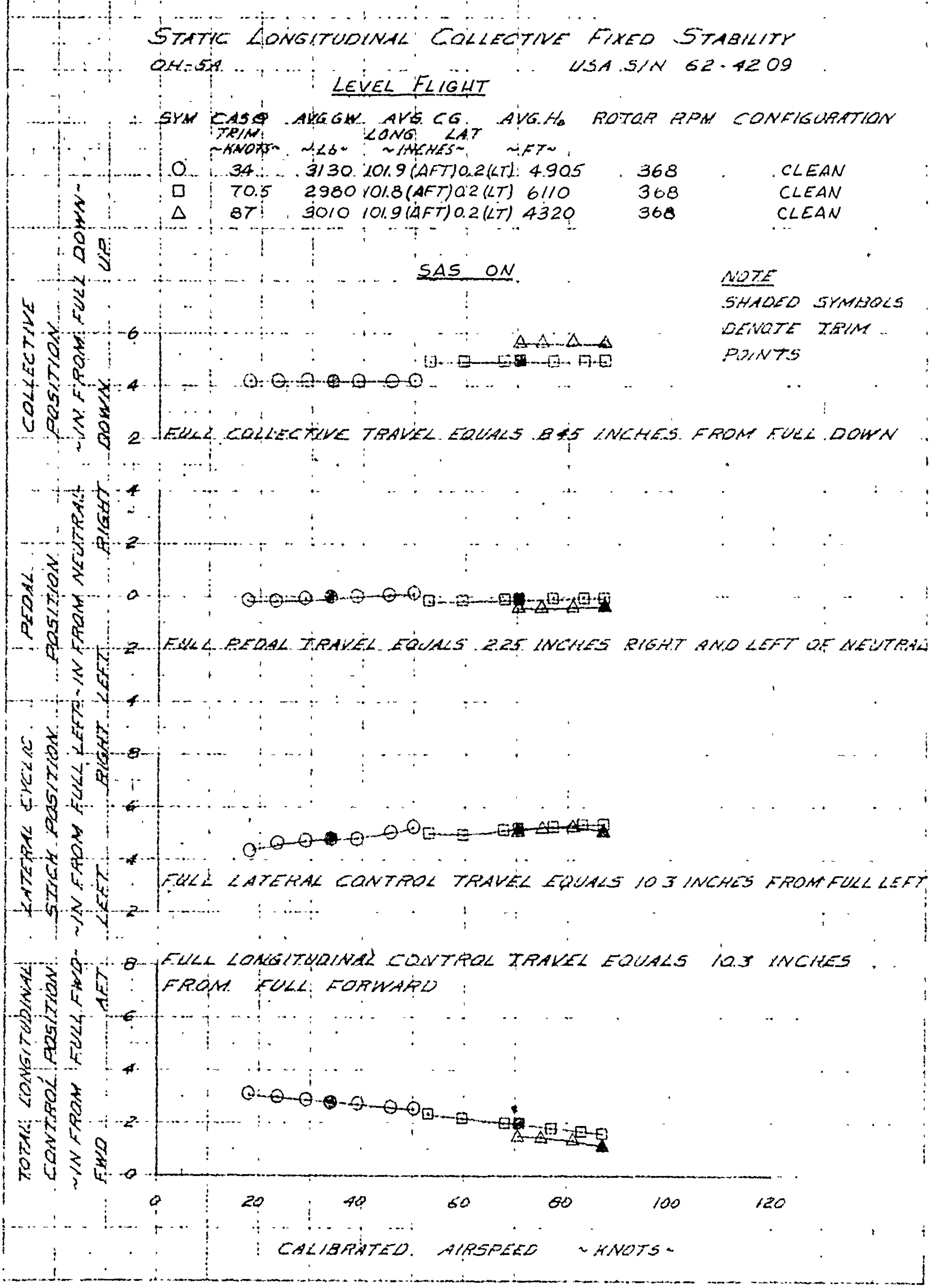
FIGURE No. 15



STATIC LONGITUDINAL COLLECTIVE FIXED STABILITY
OH-5A
USA S/N 62-4209
LEVEL FLIGHT
SYM CAS@ TRIM ~KNOTS~ AVG GW ~LB~ AVG CG LONG LAT ~INCHES~ AVG H_o ~FT~ ROTOR RPM CONFIGURATION
○ 34 3130 101.9 (AFT) 0.2 (LT) 4905 368 CLEAN
□ 70.5 2980 101.8 (AFT) 0.2 (LT) 6110 368 CLEAN
△ 87 3010 101.9 (AFT) 0.2 (LT) 4320 368 CLEAN
SAS ON
NOTE
SHADED SYMBOLS DENOTE TRIM POINTS
COLLECTIVE POSITION ~IN FROM FULL DOWN~
UP
DOWN
FULL COLLECTIVE TRAVEL EQUALS 8.45 INCHES FROM FULL DOWN
PEDAL POSITION ~IN FROM NEUTRAL~
RIGHT
LEFT
FULL PEDAL TRAVEL EQUALS 2.25 INCHES RIGHT AND LEFT OF NEUTRAL
LATERAL CYCLIC STICK POSITION ~IN FROM FULL LEFT~
RIGHT
LEFT
FULL LATERAL CONTROL TRAVEL EQUALS 10.3 INCHES FROM FULL LEFT
TOTAL LONGITUDINAL CONTROL POSITION ~IN FROM FULL FWD~
AFT
FWD
FULL LONGITUDINAL CONTROL TRAVEL EQUALS 10.3 INCHES FROM FULL FORWARD
0
20
40
60
80
100
120
CALIBRATED AIRSPEED ~KNOTS~

FIGURE No. 16

STATIC LONGITUDINAL COLLECTIVE FIXED STABILITY

OH-5A USA S/N 62-4209

AUTOROTATION

SYM	CAS TRIM ~KNOTS~	AVG. GW ~LB~	AVG. CG. LONG ~INCHES~	AVG. CG. LAT ~INCHES~	AVG. H_p ~FT~	ROTOR RPM	CONFIGURATION
△	55.5	2960	101.8 (AFT)	0.2 (LT)	5000	368	CLEAN
□	64.5	2930	101.8 (AFT)	0.2 (LT)	5000	368	CLEAN

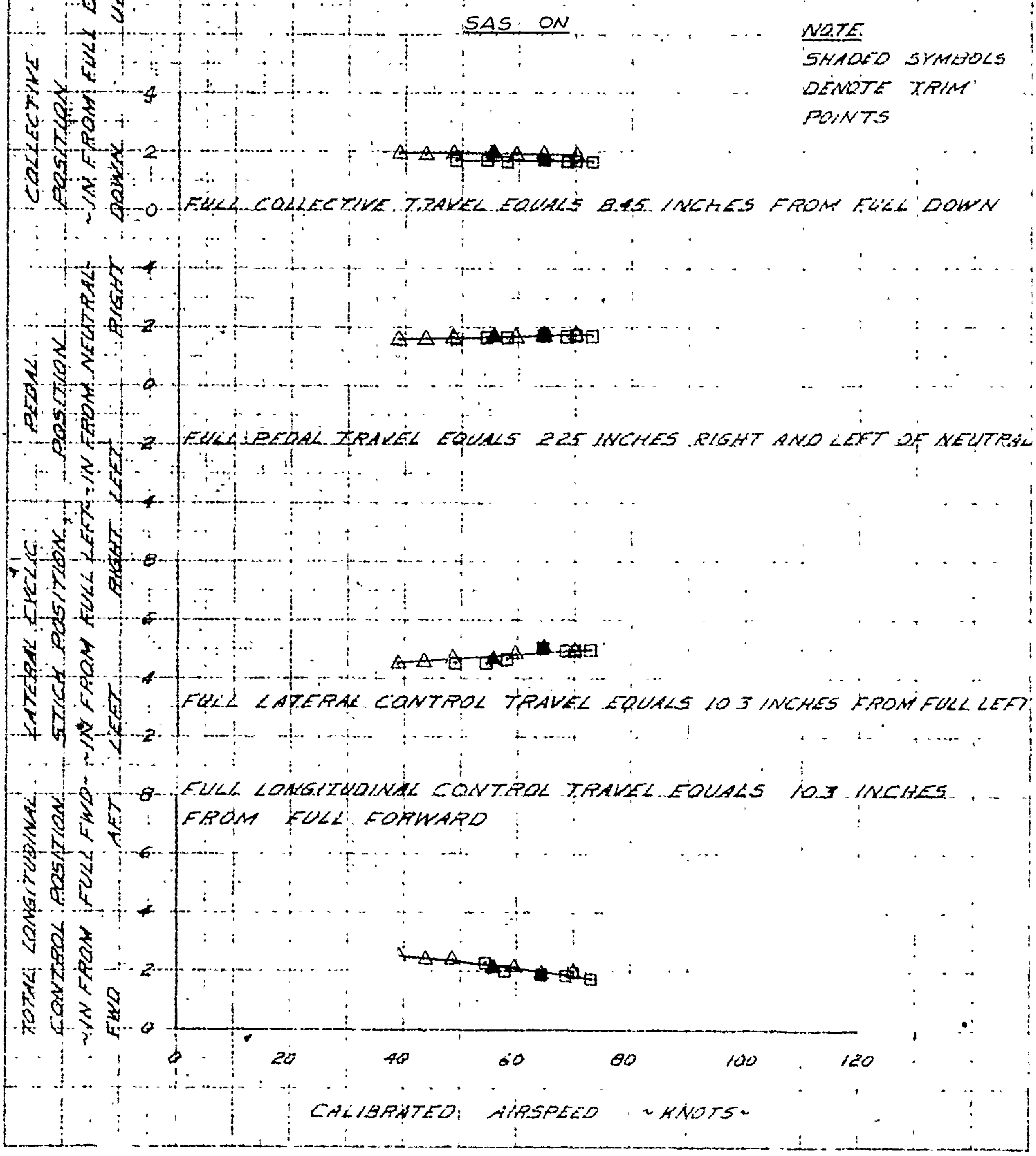


FIGURE No. 17

STATIC LONGITUDINAL COLLECTIVE FIXED STABILITY

OH-5A USA S/N 62-4209

CLIMB (MAX. CONT. POWER)

SYM	CAS@ TRIM ~KNOTS~	AVG GW ~LB~	AVG CG LONG ~INCHES~	AVG CG LAT ~INCHES~	AVG H_p ~FT~	ROTOR RPM	CONFIGURATION
O	49	2900	101.8(AFT)	0.2(LT)	5000	368	CLEAN

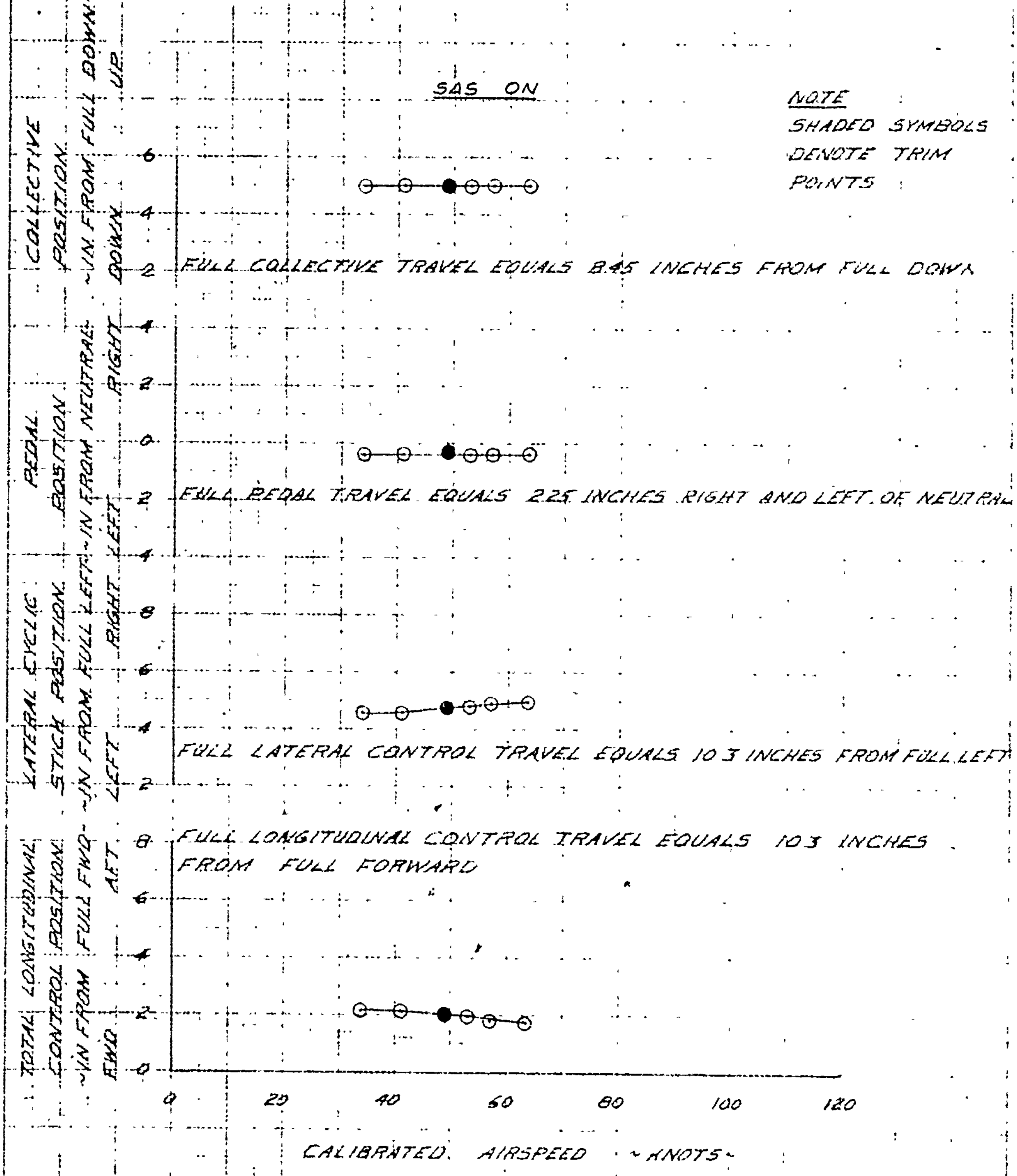


FIGURE NO. 18

STATIC LONGITUDINAL COLLECTIVE FIXED STABILITY

OH-5A USA S/N 62-4209

LEVEL FLIGHT

SYM	CAS @ TRIM ~KNOTS~	AVG GW ~LB~	AVG CG LONG ~INCHES~	AVG CG LAT ~INCHES~	AVG H_o ~FT~	ROTOR RPM	CONFIGURATION
○	34	2680	101.4 (AFT)	0.2 (LT)	10550	368	CLEAN
□	60	2690	101.4 (AFT)	0.2 (LT)	10300	368	CLEAN
△	72	2700	101.4 (AFT)	0.2 (LT)	9950	368	CLEAN

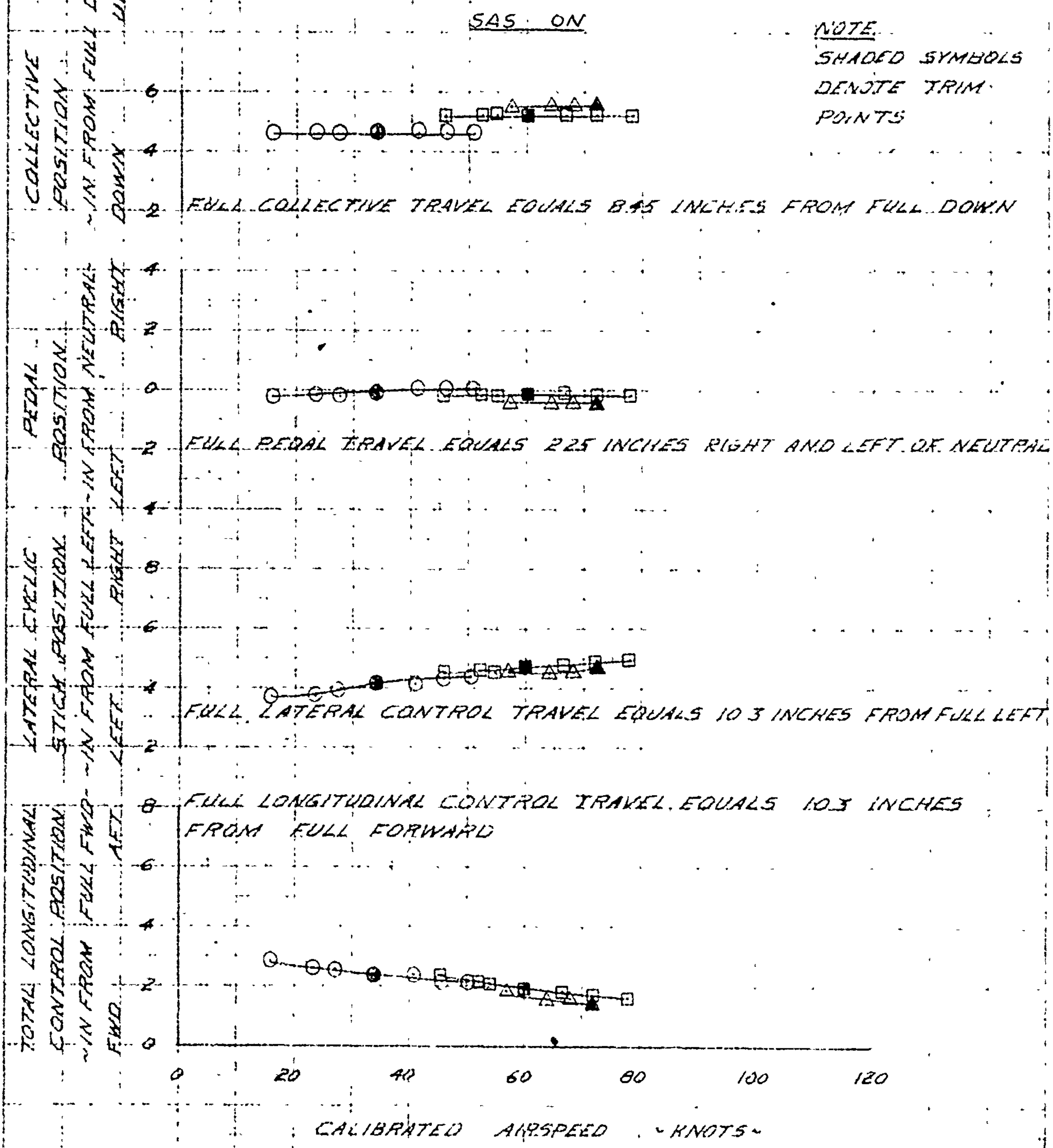


FIGURE NO. 19

STATIC LONGITUDINAL COLLECTIVE FIXED STABILITY

OH-5A USA S/N 62-4209

CLIMB (MAX CONT. POWER)

SYM	CAS @ TRIM ~KNOTS~	AVG GW ~LB~	AVG CG LONG ~INCHES~	AVG CG LAT ~INCHES~	AVG H_o ~FT~	ROTOR RPM	CONFIGURATION
O	48	2710	101.4 (AFT)	0.2 (LT)	10000	368	CLEAN

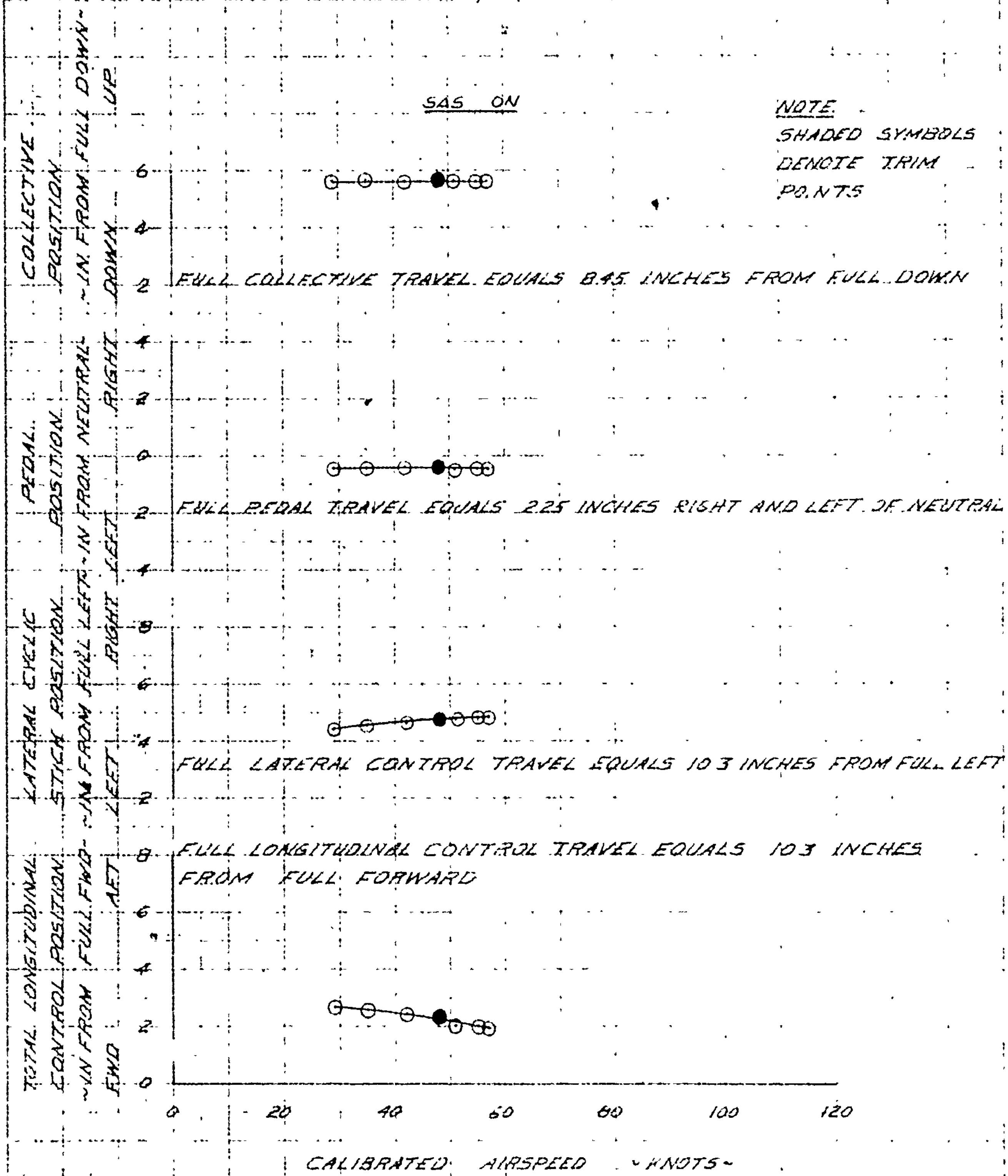


FIGURE NO. 20

STATIC LONGITUDINAL COLLECTIVE FIXED STABILITY

OH-5A USA S/N 62-4209

AUTOROTATION

SYM	CAS @ TRIM ~KNOTS~	AVG GW ~LB~	AVG CG LONG ~INCHES~	AVG CG LAT ~INCHES~	AVG H_D ~FT~	ROTOR RPM	CONFIGURATION
△	56	2530	101.3 (AFT)	0.2 (LT)	10000	368	CLEAN
□	64.5	2520	101.3 (AFT)	0.2 (LT)	10000	368	CLEAN

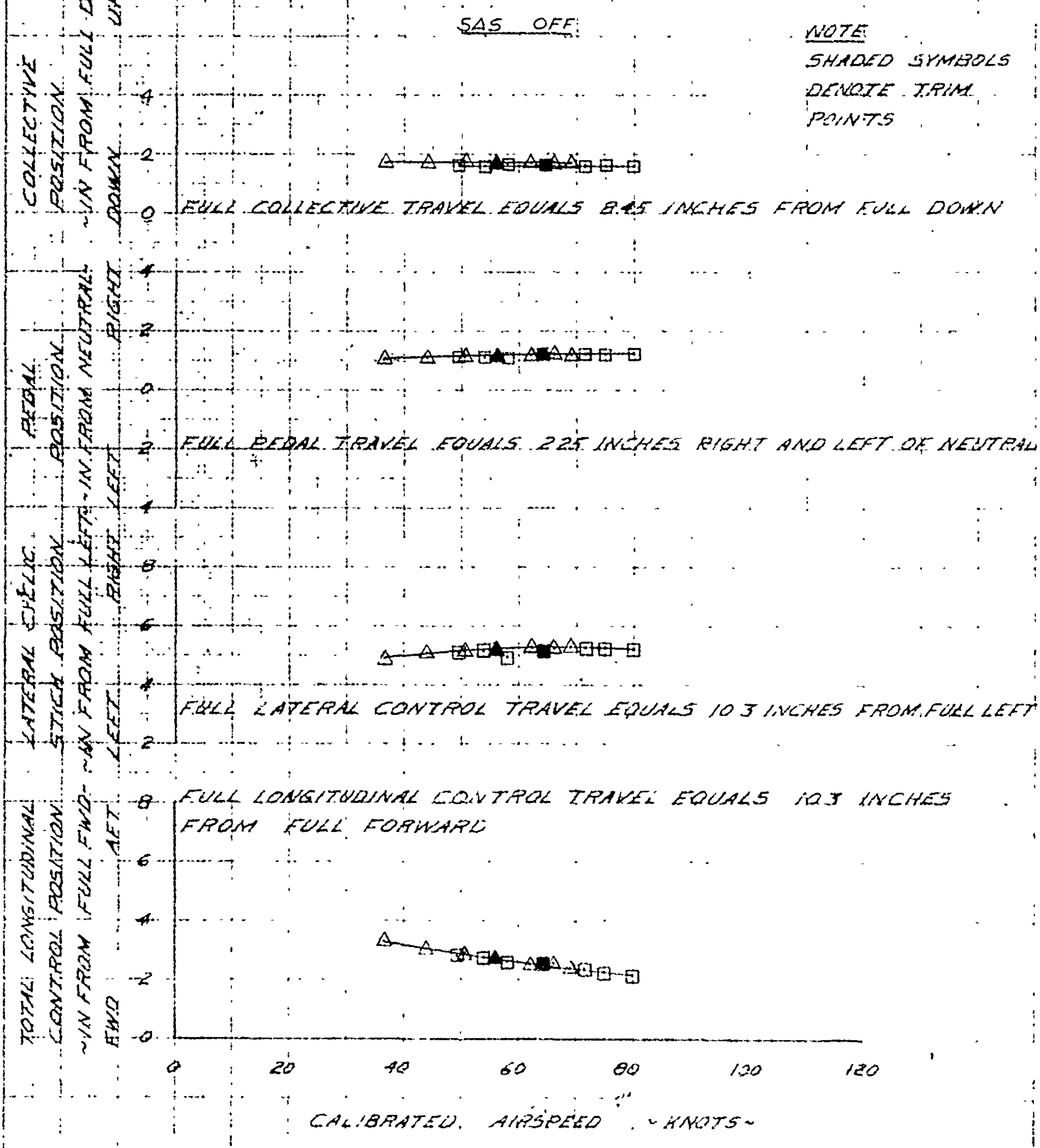


FIGURE NO. 21

STATIC LONGITUDINAL COLLECTIVE FIXED STABILITY

OH-5A USA S/N 62-4210

LEVEL FLIGHT

SYM	CAS @ TRIM ~KNOTS~	AVG.GW. ~LB~	AVG. CG LONG ~INCHES~	AVG. CG LAT ~INCHES~	AVG H_o ~FT~	ROTOR RPM	CONFIGURATION
○	35	2740	101.0 (AFT)	1.1 (LT)	5500	367	XM-7 STOWED
□	77	2710	101.0 (AFT)	1.1 (LT)	5100	368	XM-7 STOWED
△	90	2680	101.0 (AFT)	1.1 (LT)	6200	368	XM-7 STOWED

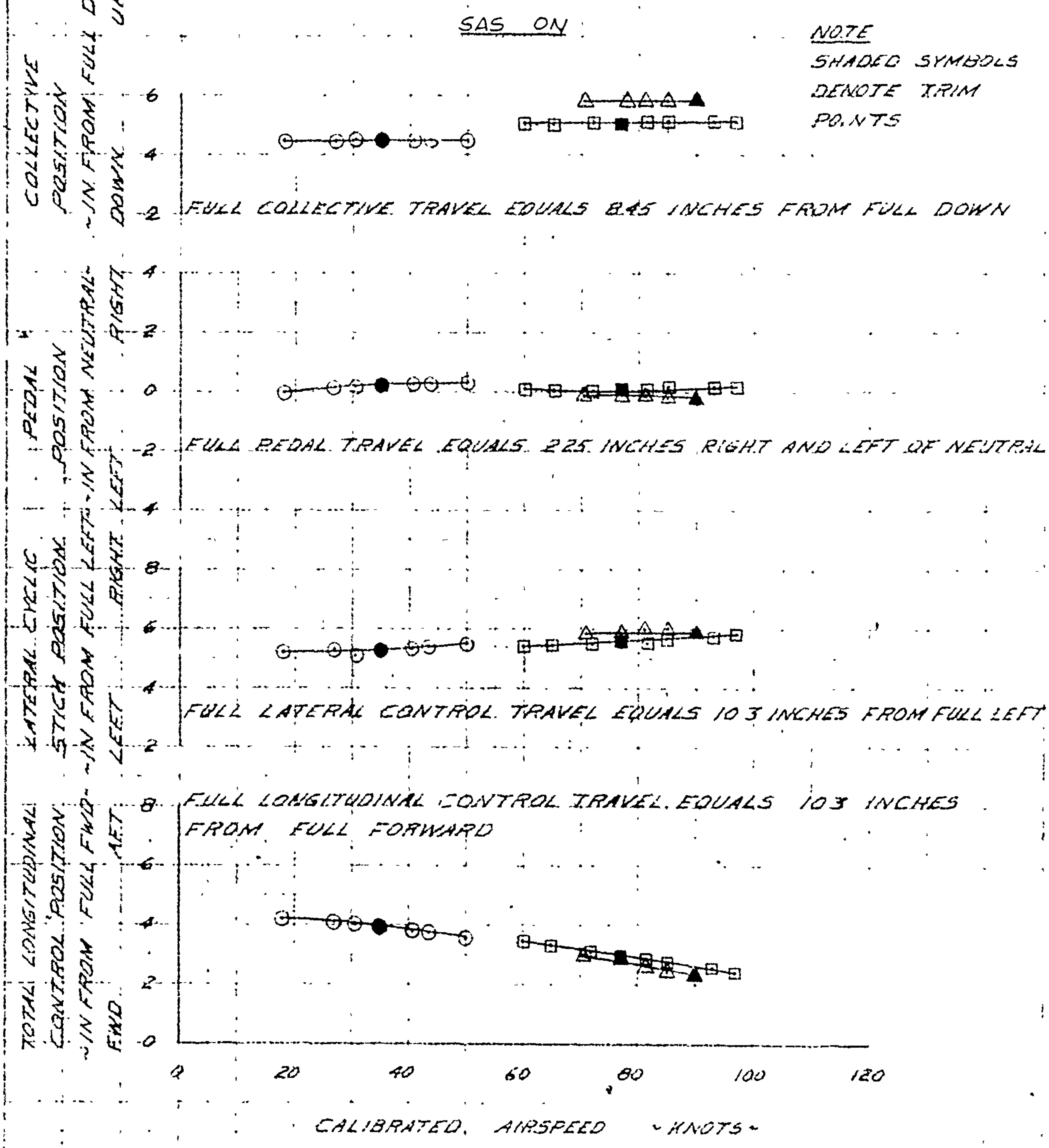


FIGURE NO. 22

STATIC LONGITUDINAL COLLECTIVE FIXED STABILITY

OH-5A USA S/N 62-4210

CLIMB (MAX CONT. POWER)

SYM.	CAS @ TRIM ~KNOTS~	AVG GW ~LB~	AVG CG LONG ~INCHES~	AVG CG LAT ~INCHES~	AVG H_o ~FT~	ROTOR RPM	CONFIGURATION
O	48	2650	101.0(AFT)	1.1(LT)	5000	368	XM-7 STOWED

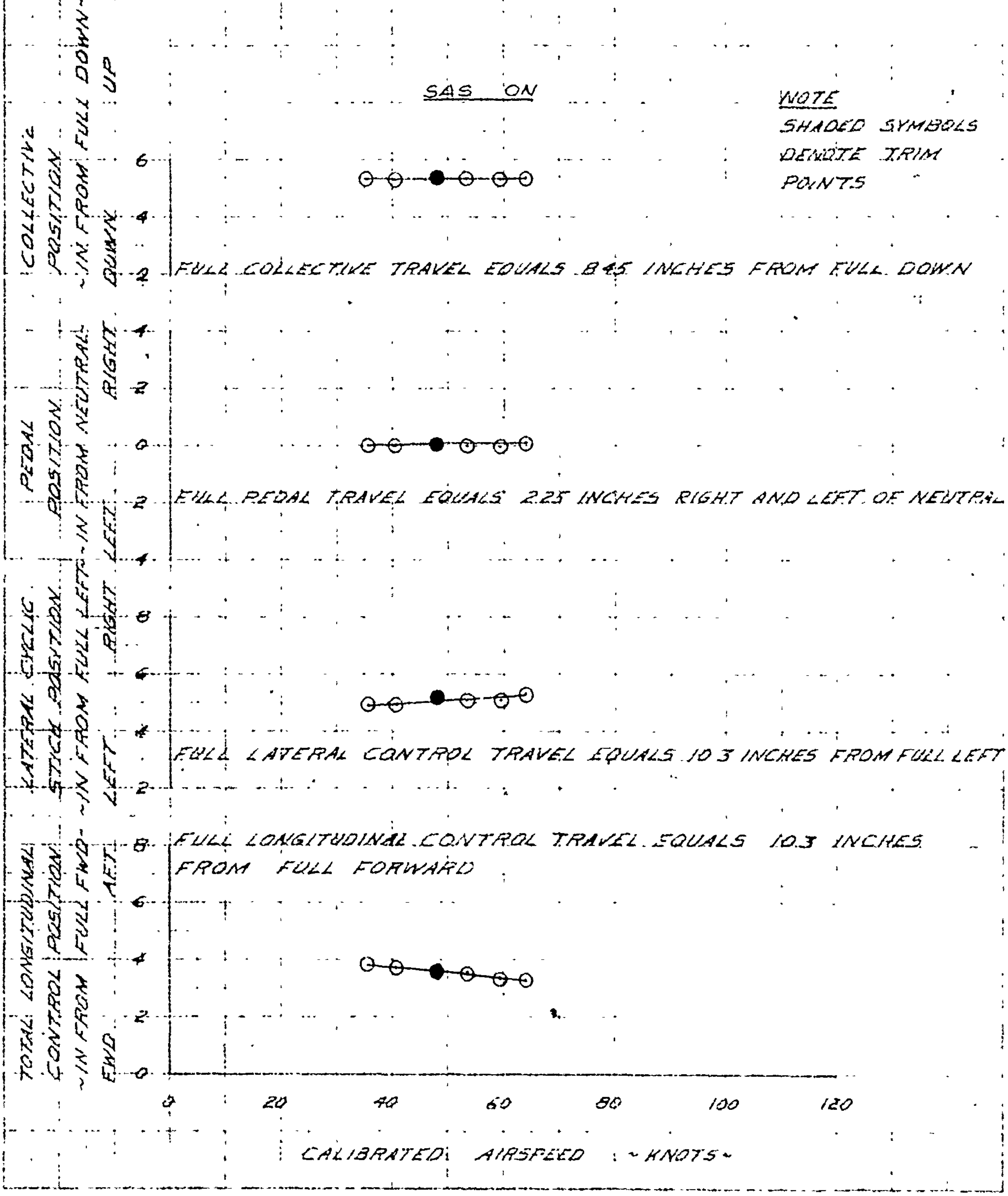


FIGURE NO. 23

STATIC LONGITUDINAL COLLECTIVE FIXED STABILITY

OH-5A USA S/N 62-4210

AUTOROTATION

SYM	CAS@ TRIM ~KNOTS~	AVG GW ~LB~	AVG CG LONG ~INCHES~	AVG CG LAT ~INCHES~	AVG H_s ~FT~	ROTOR RPM	CONFIGURATION
O	55.5	2620	101.1 (AFT)	11 (LT)	5000	368	XM-7 STOWED

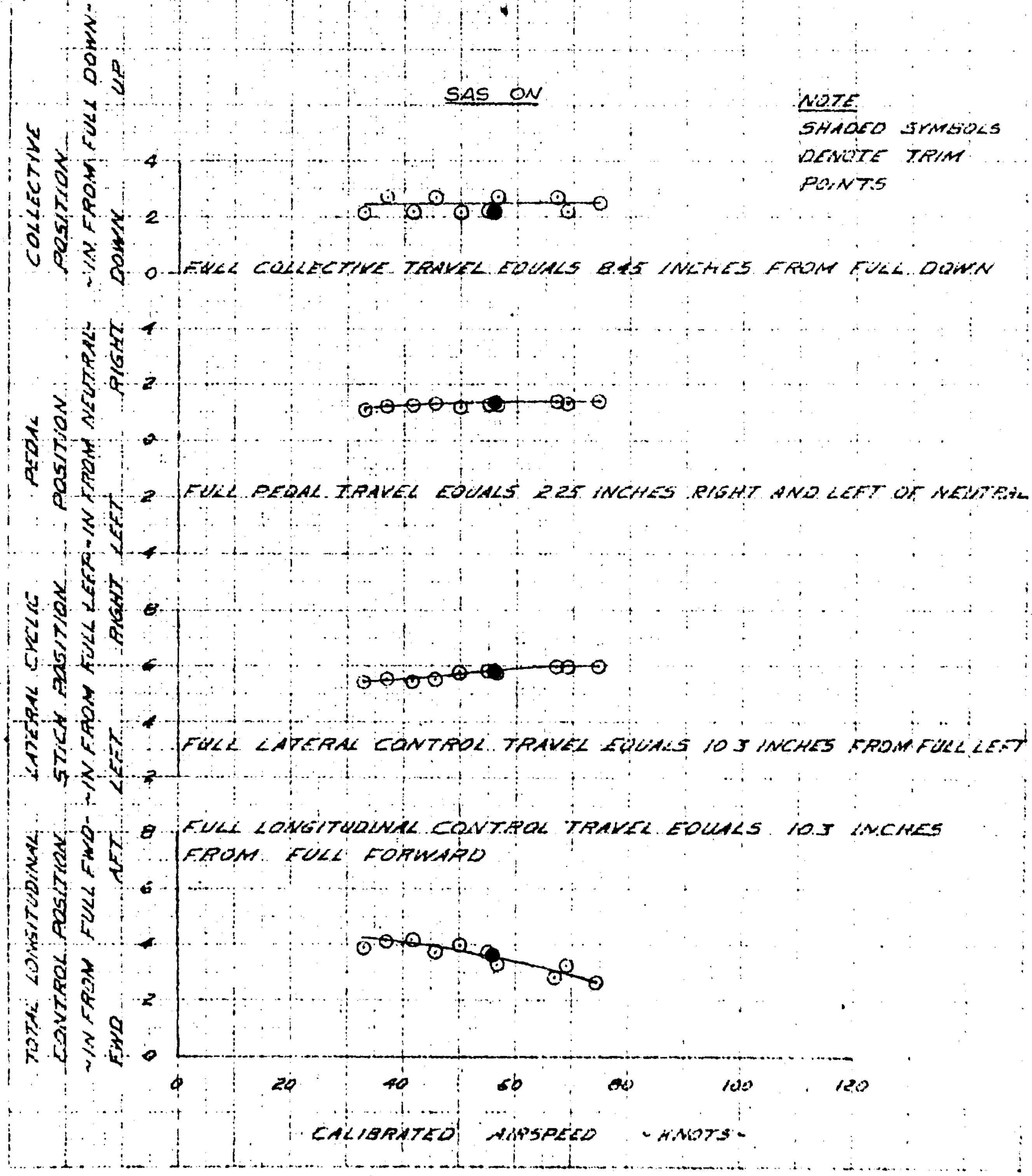


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FIGURE NO. 24

STATIC LONGITUDINAL COLLECTIVE FIXED STABILITY

OH-5A USA S/N 62-4210

LEVEL FLIGHT

SYM	CAS @ TRIM ~KNOTS~	AVG GW ~LB~	AVG CG LONG ~INCHES~	AVG CG LAT ~INCHES~	AVG H_p ~FT~	ROTOR RPM	CONFIGURATION
○	35	2730	101.2 (AFT)	0.3 (RT)	5200	368	XM-8 STOWED
□	78	2710	101.1 (AFT)	0.3 (RT)	5300	368	XM-8 STOWED
△	97.5	2690	101.1 (AFT)	0.3 (RT)	5700	368	XM-8 STOWED

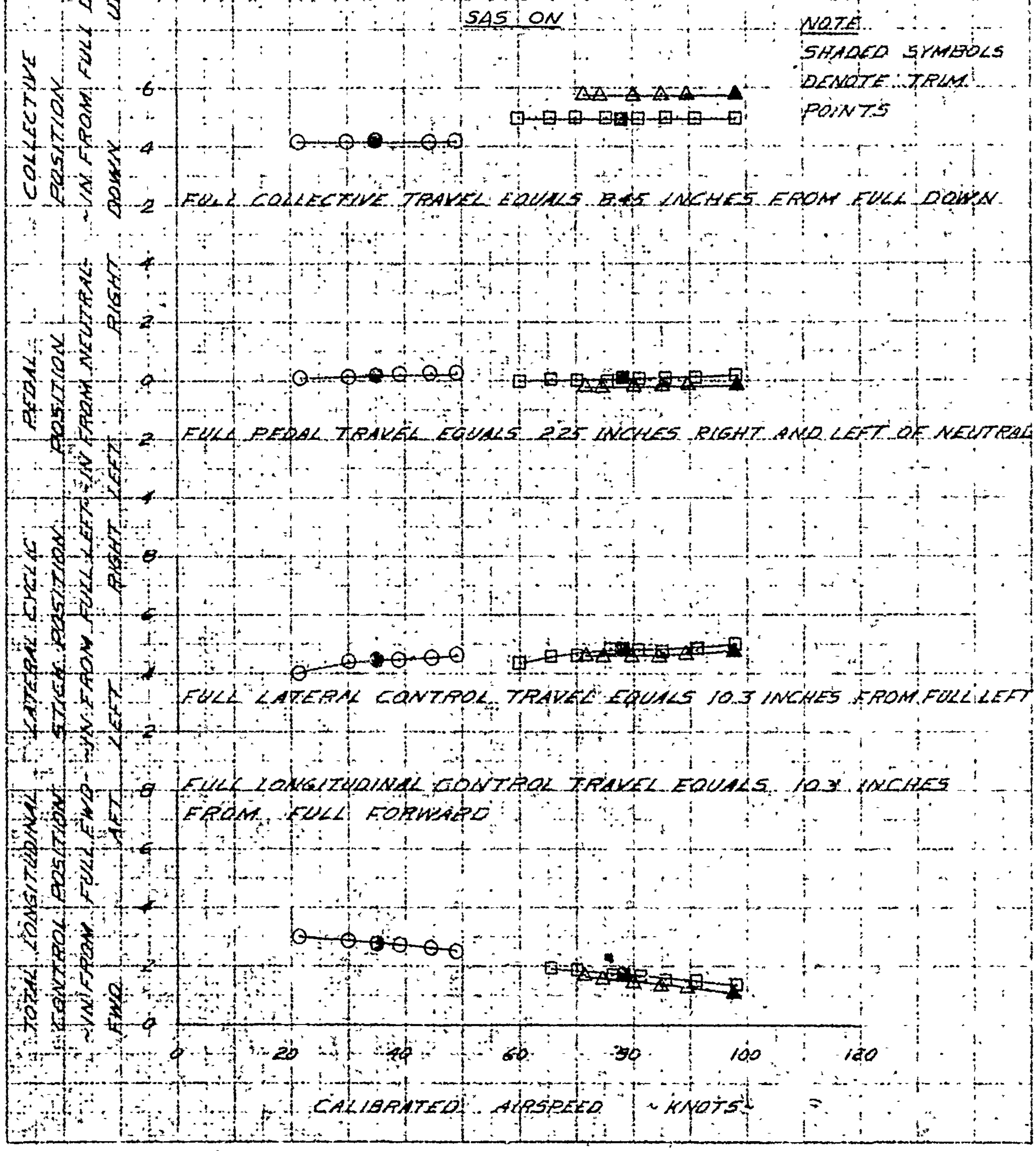

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FIGURE NO. 25

STATIC LONGITUDINAL COLLECTIVE FIXED STABILITY

OH-5A USA S/N: 62-4210

CLIMB (MAX. CONT. POWER)

SYM	CAS @ TRIM ~KNOTS~	AVG. GW. ~LB~	AVG. CG. LONG ~INCHES~	AVG. CG. LAT ~INCHES~	AVG. H_p ~FT~	ROTOR RPM	CONFIGURATION
O	49	2660	101.1 (AFT)	0.3 (RT)	5000	368	XM-8 STOWED

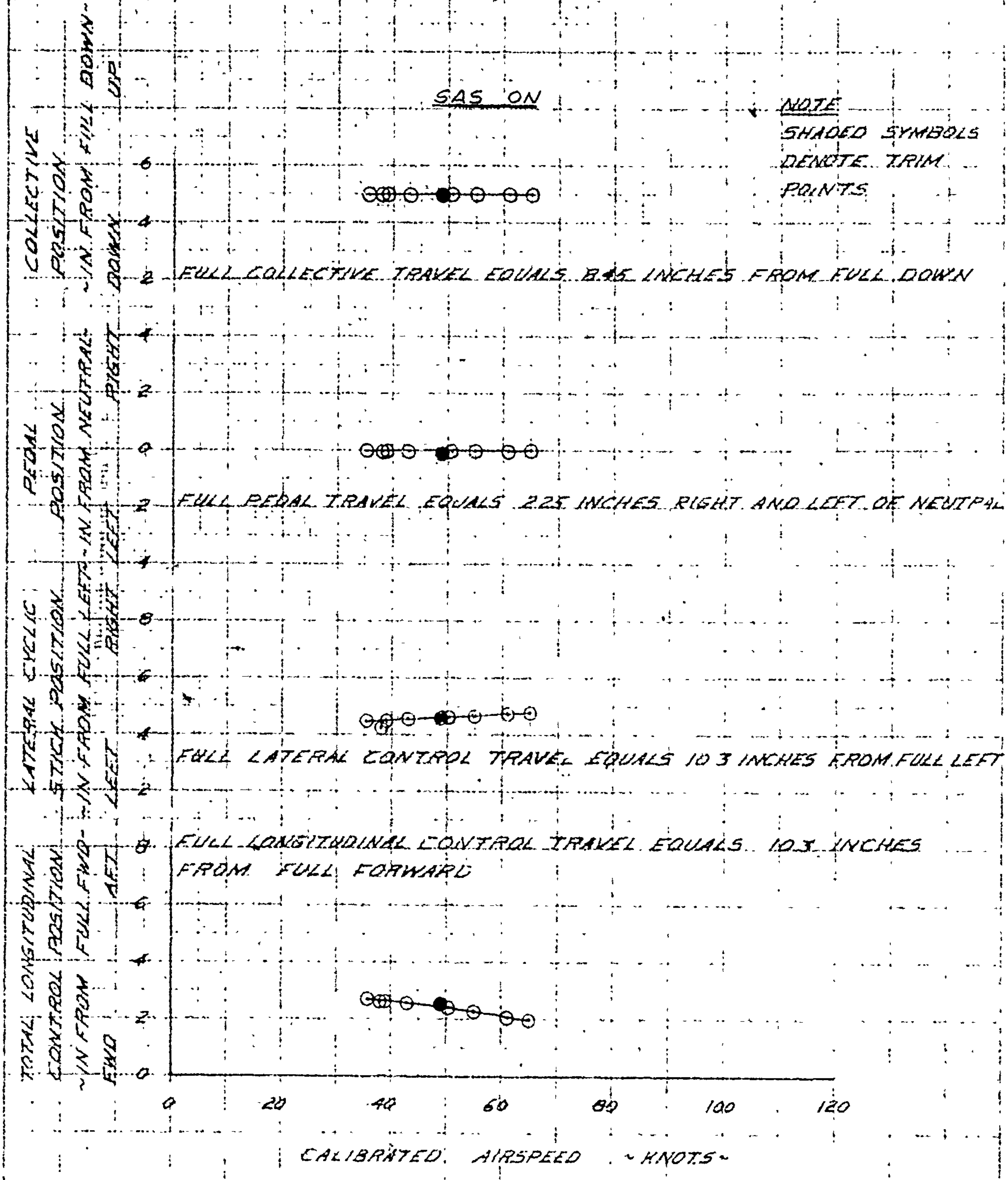

FIGURE NO. 26

STATIC LONGITUDINAL COLLECTIVE FIXED STABILITY

OH-5A USA S/N. 62-4210

AUTOROTATION

SYM	CAS @ TRIM ~KNOTS~	AVG GW ~LB~	AVG CG LONG ~INCHES~	AVG CG LAT ~INCHES~	AVG H_p ~FT~	ROTOR RPM	CONFIGURATION
O	53.5	2640	101.1 (AFT)	0.3 (RT)	5000	368	XM-8 STOWED

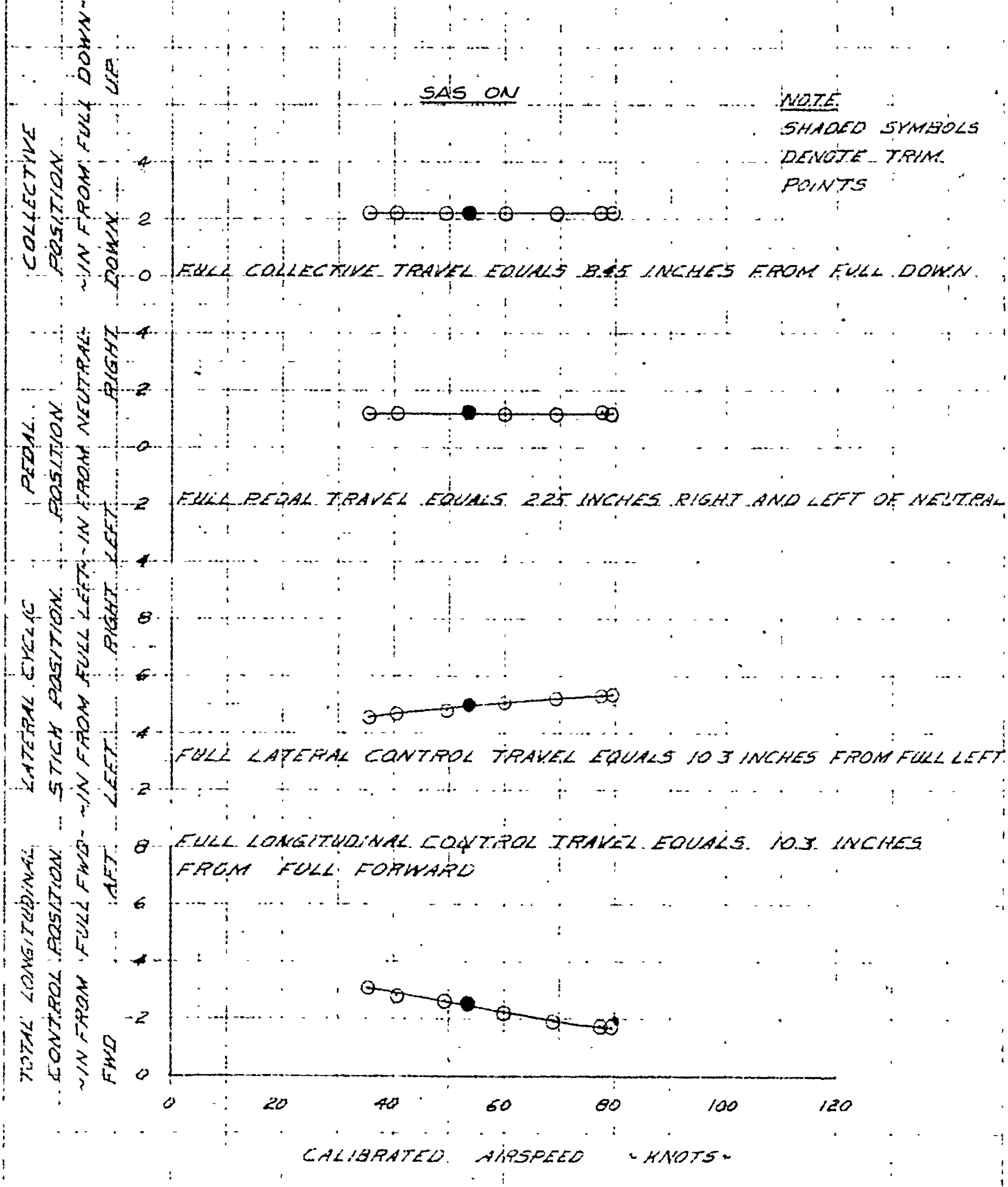

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FIGURE No. 27

SUMMARY OF LATERAL-DIRECTIONAL STABILITY

OH-5A USA S/N 62-4209 & 10

ALL VALUES DETERMINED AT ZERO SIDESLIP

SYM	AVG. H_p ~FT.	AVG G.W ~LB	AVG C.G ~ IN LONG.	AVG C.G ~ IN LAT	ROTOR RPM	CONFIGURATION	FLT COND	SAS COND.
○	5600	2610	101.3(AFT)	0.2 LT.	368	CLEAN	LEVEL FLT. AND NOTED	ON
⊖	10800	2650	101.3(AFT)	0.2 LT	368	CLEAN	LEVEL FLT. AND NOTED	ON
△	6000	2960	101.8(AFT)	0.2 LT	368	CLEAN	LEVEL FLT. AND NOTED	ON
□	6400	2620	101.3(AFT)	0.2 LT	368	CLEAN	LEVEL FLT. AND NOTED	OFF
◇	5000	2680	101.1(AFT)	1.1 LT	368	XM-7	LEVEL FLT. AND NOTED	ON
◁	6500	2680	101.1(AFT)	0.3 RT.	368	XM-8	LEVEL FLT. AND NOTED	ON

NOTE:
1. FLAG ON SYMBOL DENOTES CLIMB
2. SHADED SYMBOL DENOTES AUTOROTATION

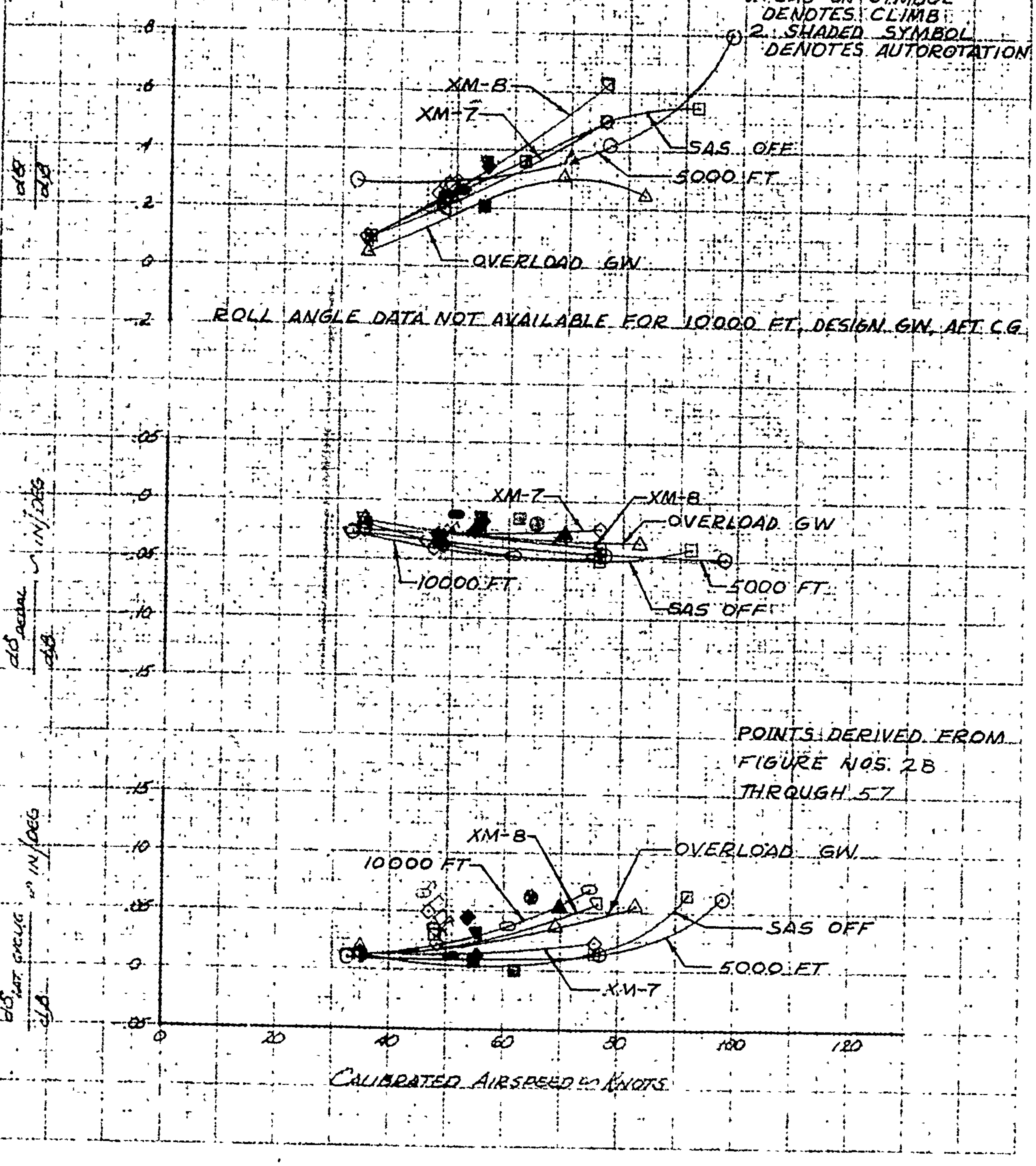

FIGURE NO. 28.

STATIC LATERAL - DIRECTIONAL STABILITY

OH-5A USA S/N 62-4209

LEVEL FLIGHT

AVG GROSS WEIGHT = 2570 LB AVG C.G. LOCATION = 101.3 (AFT)

AVG DENSITY ALTITUDE = 4800 FT ROTOR RPM = 368

CALLBRATED AIRSPEED = 33 KNOTS

CLEAN CONFIGURATION

SAS ON

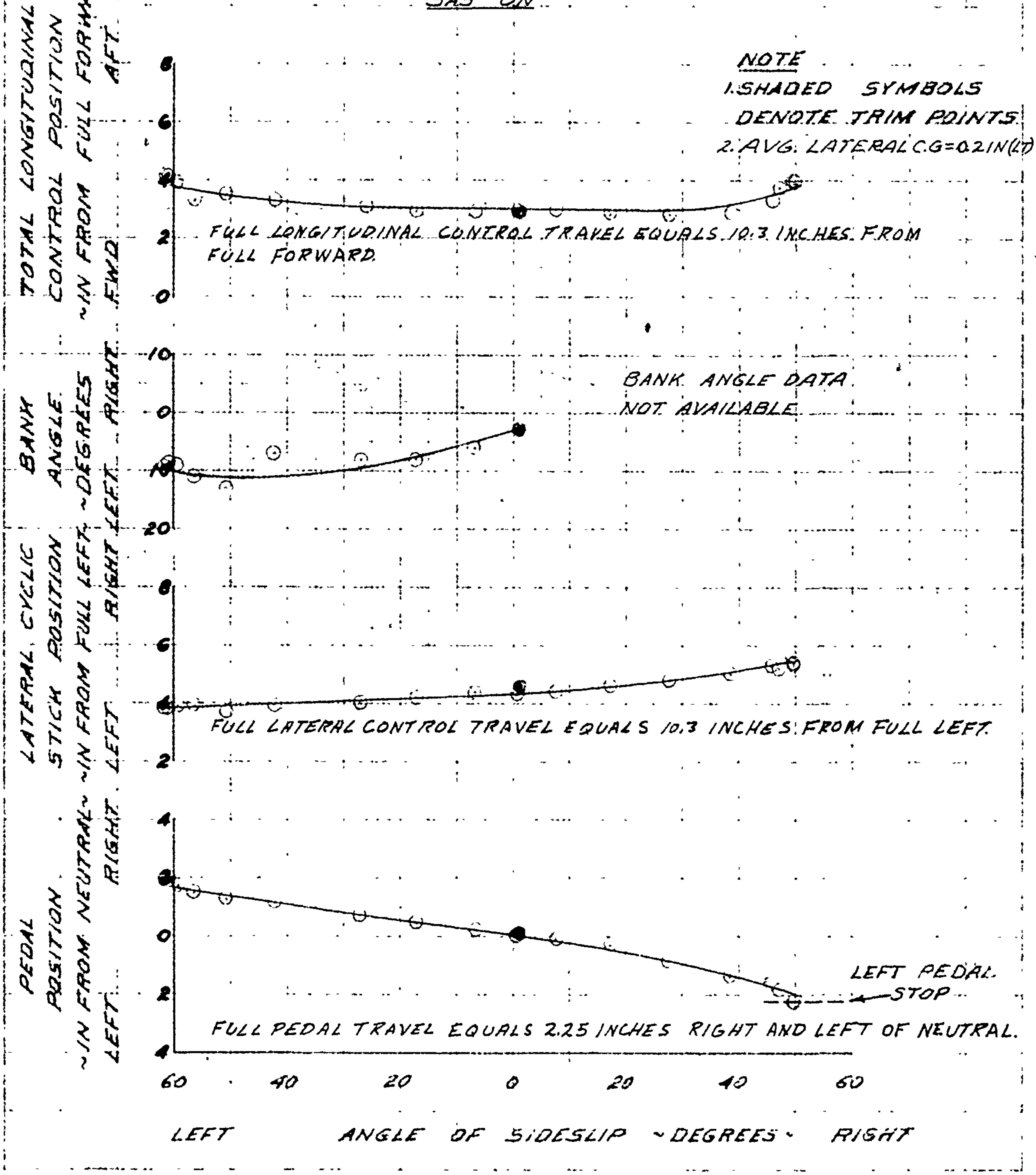

FIGURE NO. 29

STATIC LATERAL - DIRECTIONAL STABILITY

OH-5A USA S/N 62-4209

LEVEL FLIGHT

AVG GROSS WEIGHT = 2580 LB AVG. CG. LOCATION = 101.3 (AFT)
AVG DENSITY ALTITUDE = 6200 FT ROTOR RPM = 368
CALIBRATED AIRSPEED = 35 KNOTS
CLEAN CONFIGURATION
SAS OFF

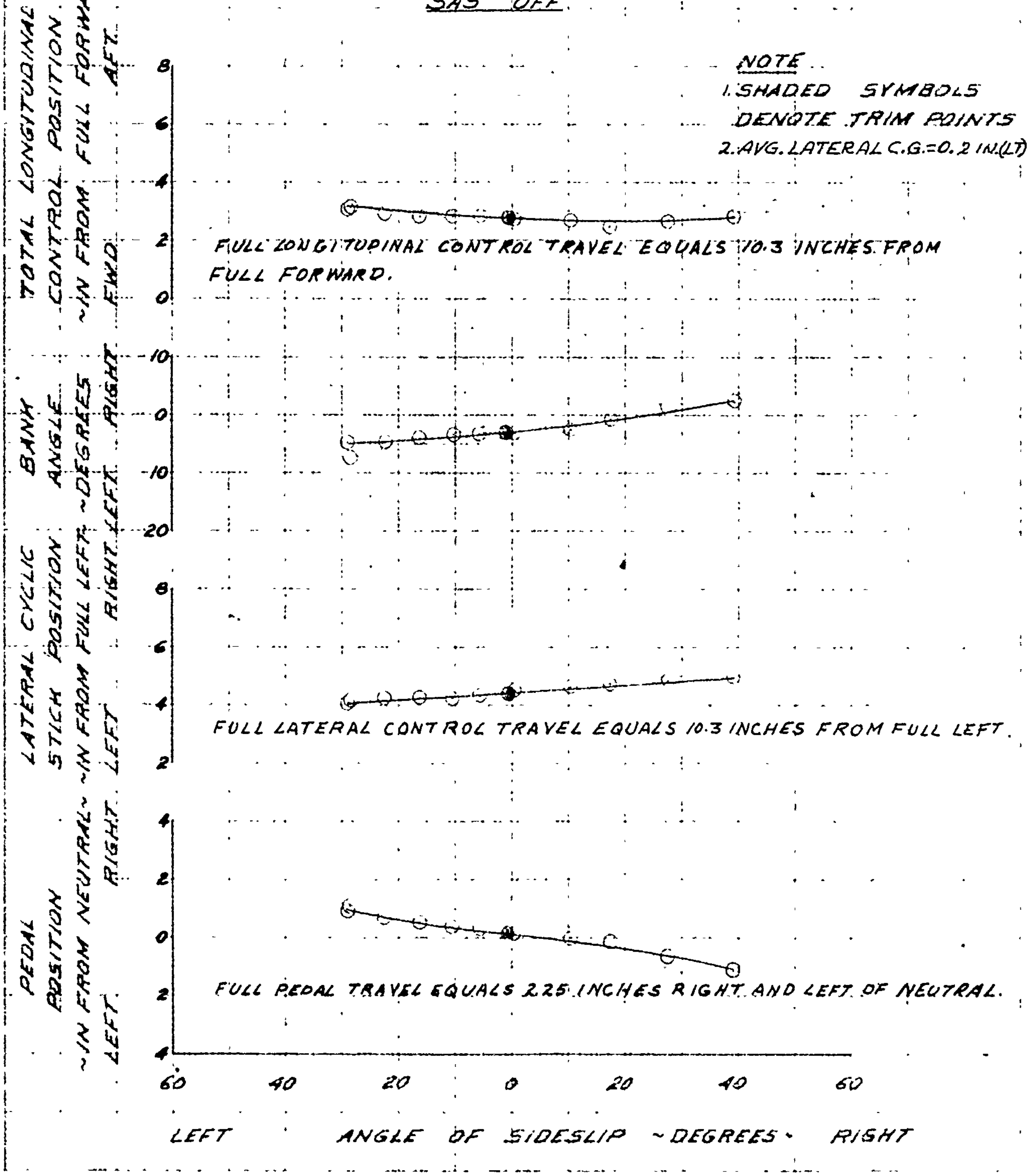

FIGURE No. 30

STATIC LATERAL - DIRECTIONAL STABILITY

OH-5A USA S/N 62-4209

LEVEL FLIGHT

AVG GROSS WEIGHT = 2610 LB AVG CG LOCATION = 101.3 (AFT)
AVG DENSITY ALTITUDE = 6000 FT ROTOR RPM = 368
CALIBRATED AIRSPEED = 77 KNOTS
CLEAN CONFIGURATION
SAS ON

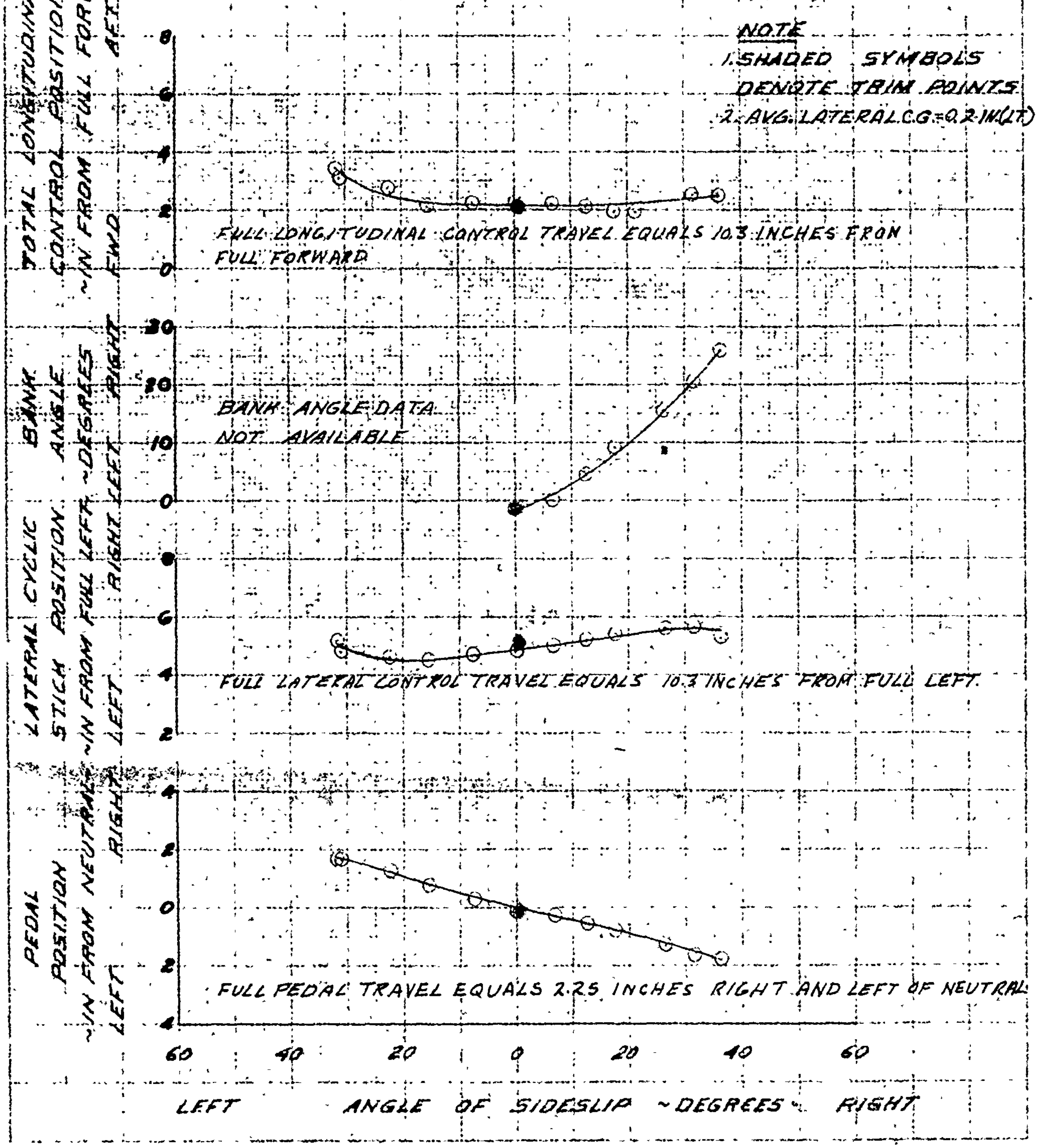

FIGURE No. 31

STATIC LATERAL - DIRECTIONAL STABILITY

OH-5A USA S/N 62-4209

LEVEL FLIGHT

AVG GROSS WEIGHT = 2600 LB AVG. C.G. LOCATION = 101.3 (AFT)

AVG DENSITY ALTITUDE = 6000 FT ROTOR RPM = 368

CALIBRATED AIRSPEED = 76 KNOTS

CLEAN CONFIGURATION

SAS OFF

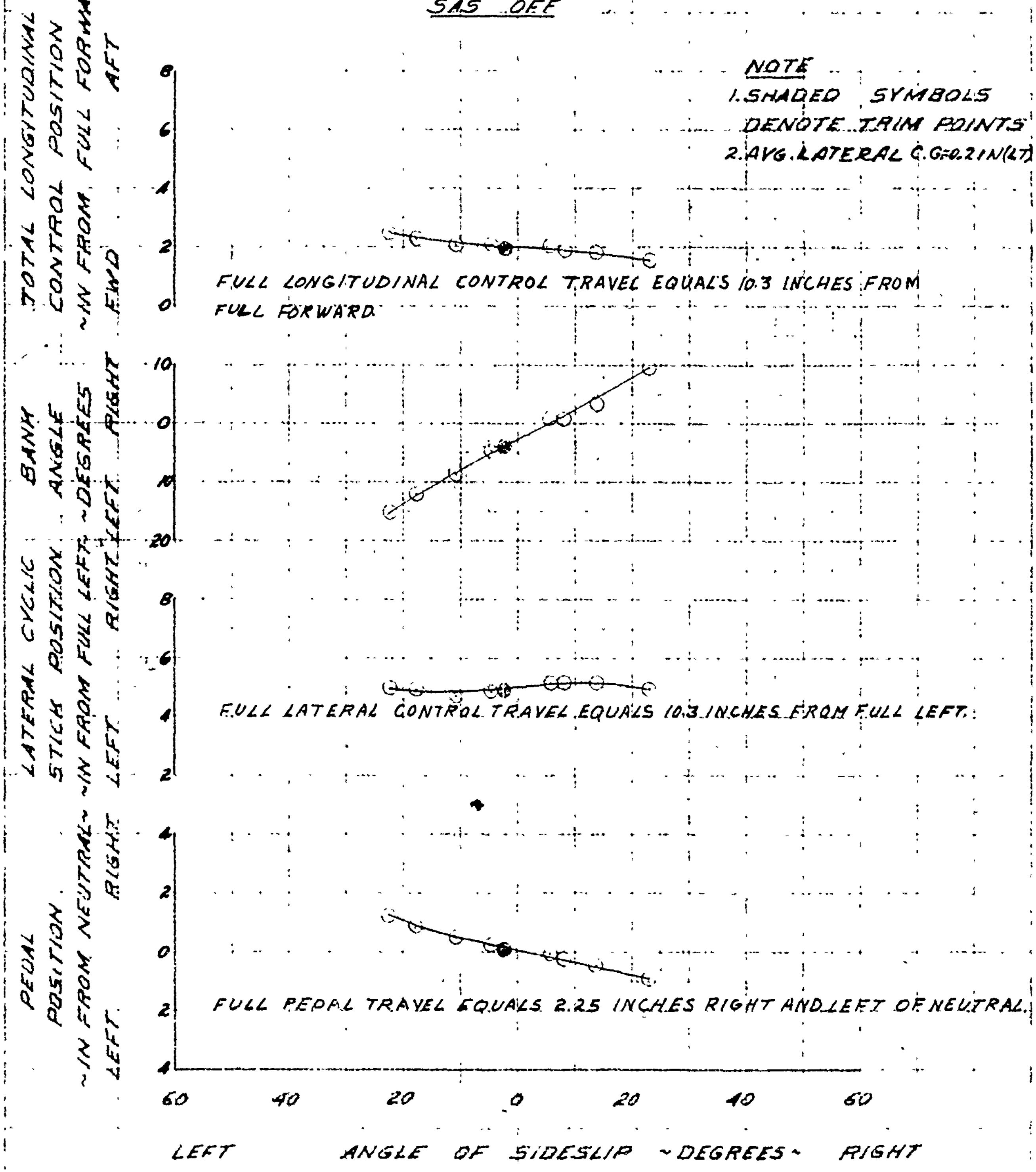

FIGURE No. 32

STATIC LATERAL - DIRECTIONAL STABILITY

OH-5A USA S/N 62-4209

LEVEL FLIGHT

AVG GROSS WEIGHT = 2650 LB AVG CG LOCATION = 101.3 (AFT)

AVG DENSITY ALTITUDE = 5900 FT ROTOR RPM = 368

CALIBRATED AIRSPEED = 98 KNOTS

CLEAN CONFIGURATION

SAS ON

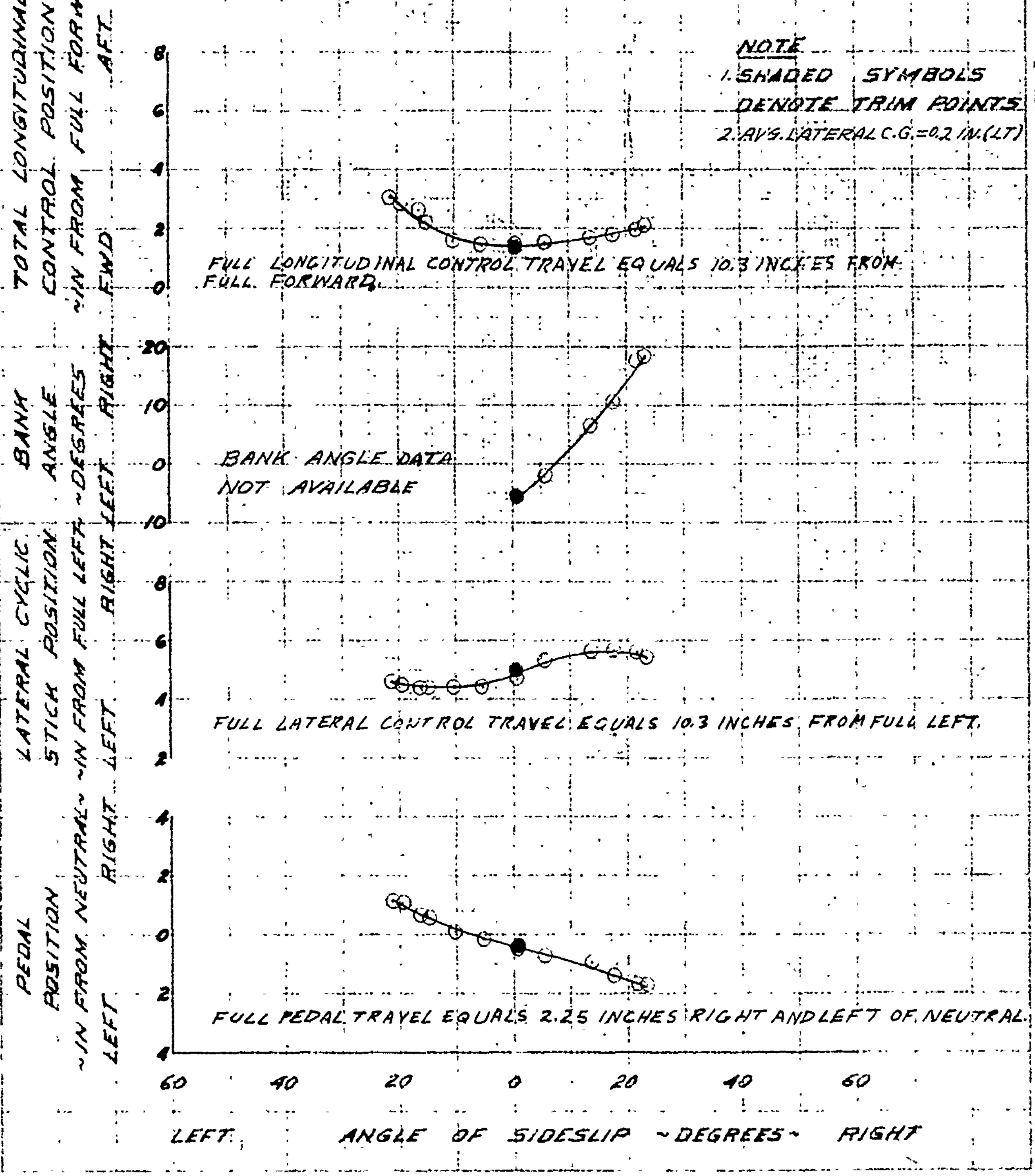

FIGURE No. 33

STATIC LATERAL - DIRECTIONAL STABILITY

OH-5A USA S/N 62-4209

LEVEL FLIGHT

AVG GROSS WEIGHT = 2690 LB AVG. CG. LOCATION = 101.4 (AFT)
AVG DENSITY ALTITUDE = 6900 FT ROTOR RPM = 368
CALIBRATED AIRSPEED = 92 KNOTS
CLEAN CONFIGURATION
SAS OFF

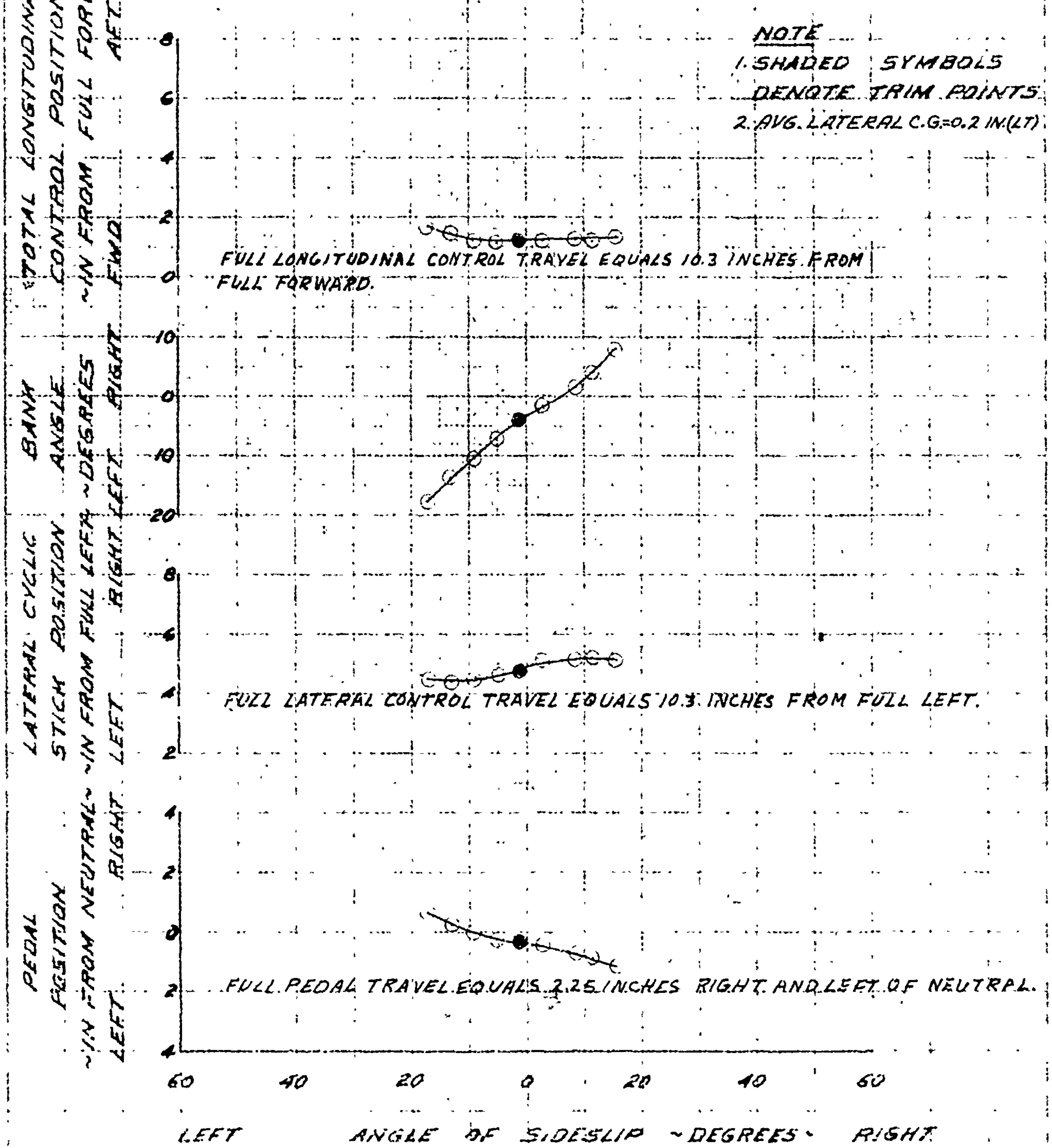

FIGURE No. 34

STATIC LATERAL - DIRECTIONAL STABILITY
OH-5A USA S/N 62-4209
CLIMB (MAX. CONT. POWER)
AVG GROSS WEIGHT = 2750 LB AVG CG LOCATION = 101.4 (AFT)
AVG DENSITY ALTITUDE = 5000 FT ROTOR RPM = 358
CALIBRATED AIRSPEED = 47 KNOTS
CLEAN CONFIGURATION
SAS ON

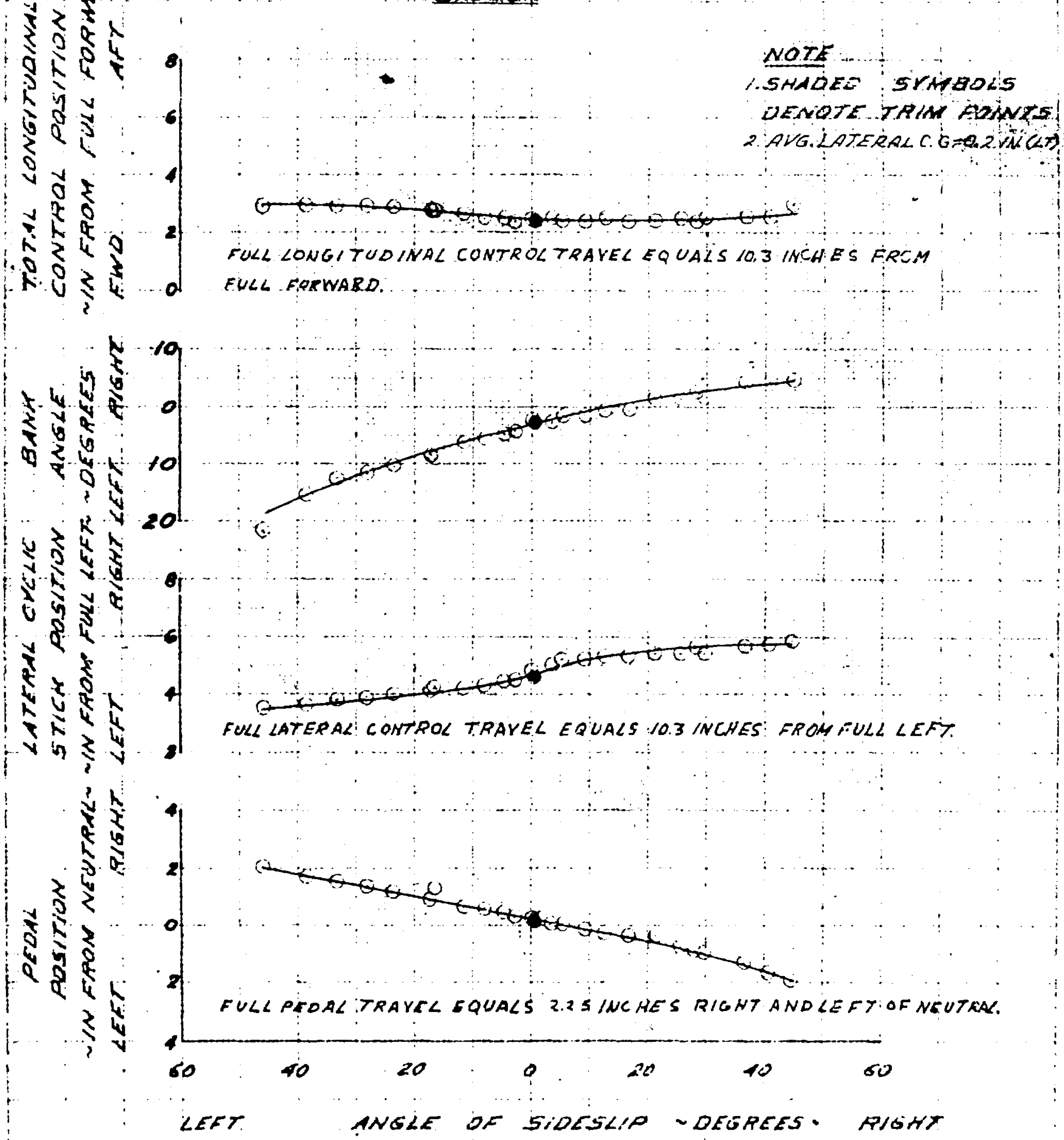

FIGURE NO. 35

STATIC LATERAL - DIRECTIONAL STABILITY

OH-5A USA S/N 62-4209

CLIMB (MAX. CONT. POWER)

AVG GROSS WEIGHT = 2725 LB AVG CG LOCATION = 101.4 (AFT)

AVG DENSITY ALTITUDE = 5000 FT ROTOR RPM = 368

CALIBRATED AIRSPEED = 48 KNOTS

CLEAN CONFIGURATION

SAS OFF

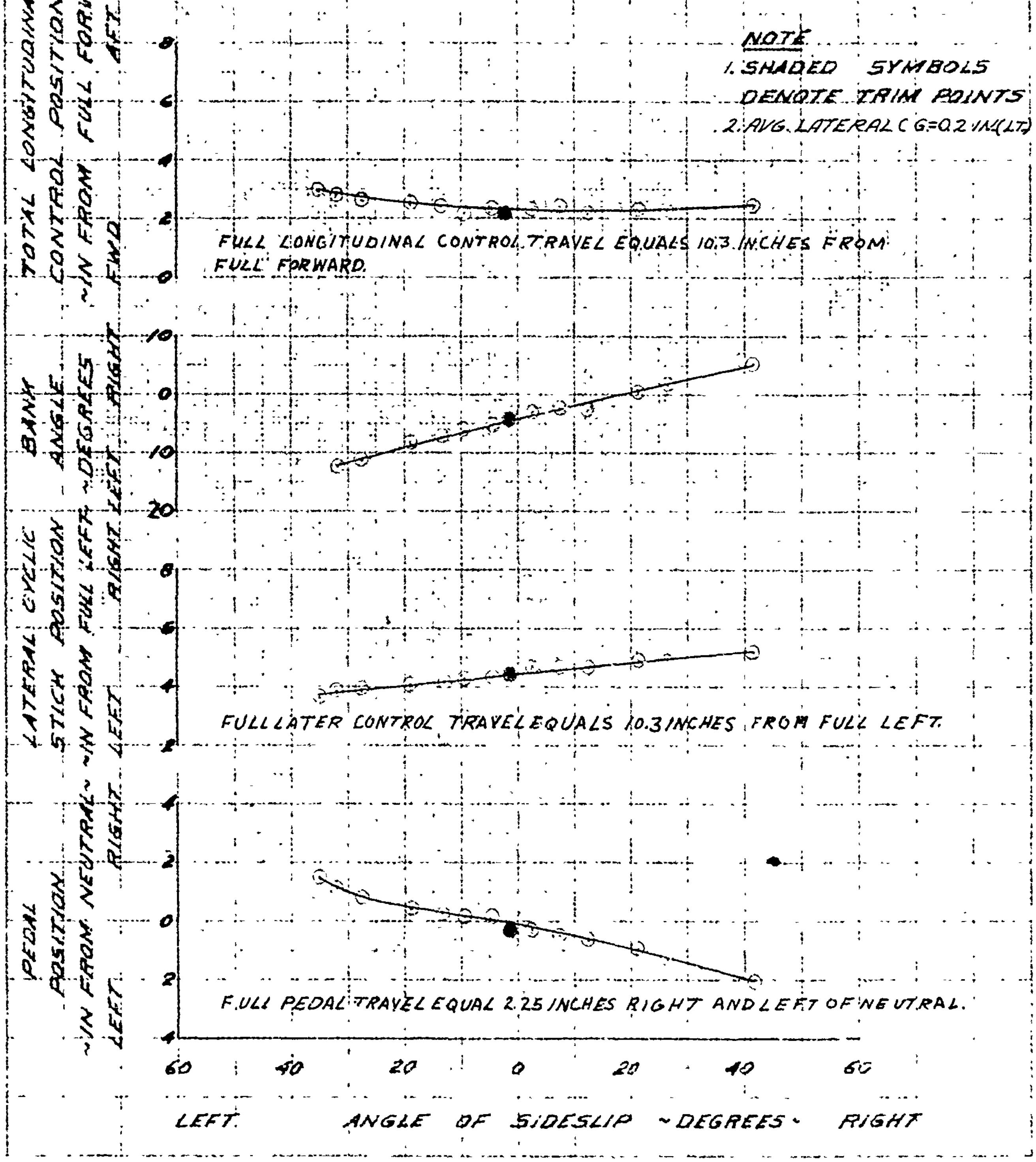

FIGURE NO. 36

STATIC LATERAL - DIRECTIONAL STABILITY

OH-5A USA S/N 62-4209

AUTOROTATION

AVG GROSS WEIGHT = 2700 LB. AVG C.G. LOCATION = 101.4 (AFT)
AVG DENSITY ALTITUDE = 5000 FT ROTOR RPM = 368
CALIBRATED AIRSPEED = 54 KNOTS
CLEAN CONFIGURATION
SAS ON

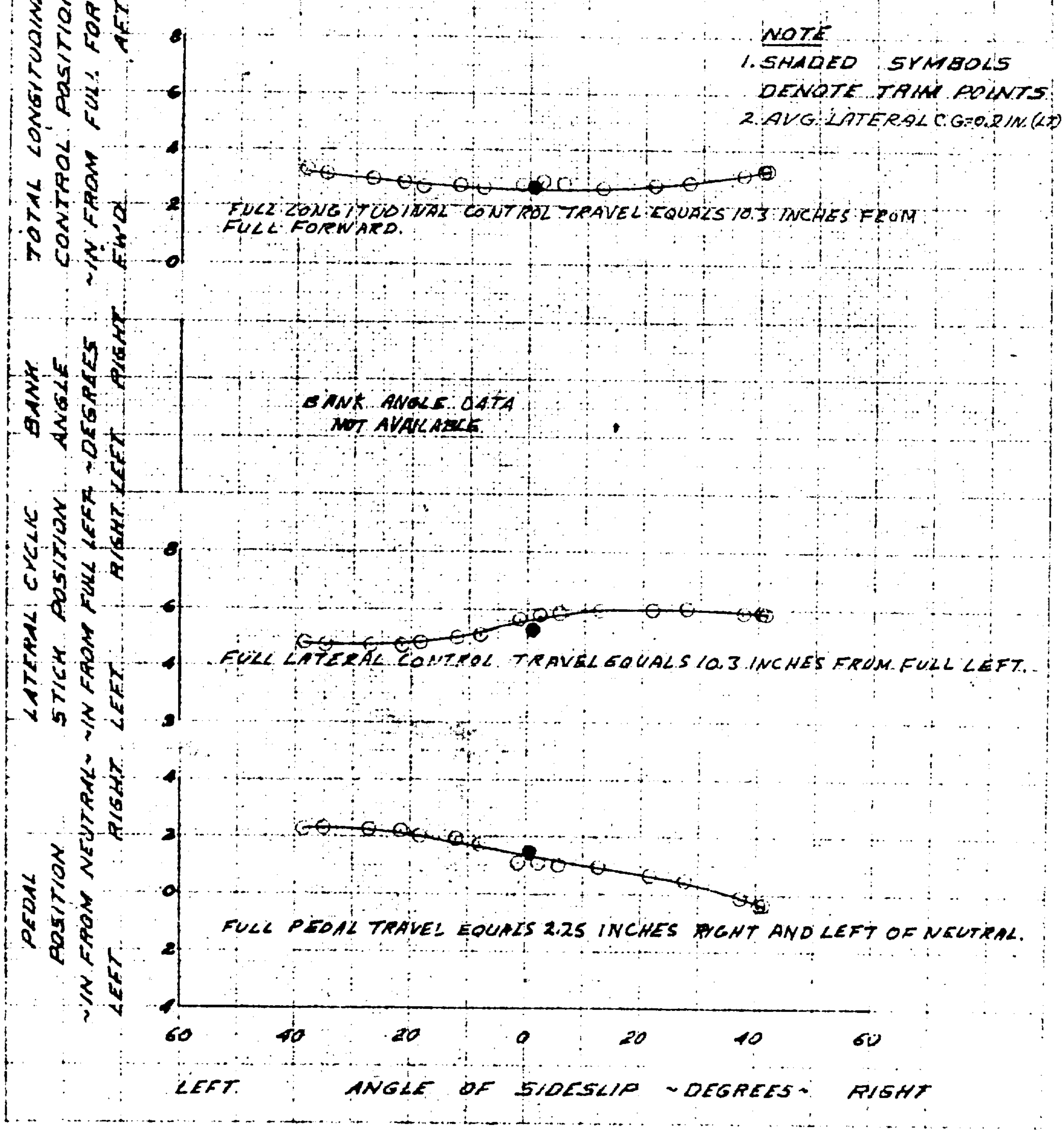

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FIGURE NO. 37

STATIC LATERAL - DIRECTIONAL STABILITY

OH-5A USA S/N 62-4209

AUTOROTATION

AVG GROSS WEIGHT = 2715 LB AVG C.G. LOCATION = 101.4 (AFT)

AVG DENSITY ALTITUDE = 5000 FT ROTOR RPM = 368

CALIBRATED AIRSPEED = 55 KNOTS

CLEAN CONFIGURATION

SAS OFF

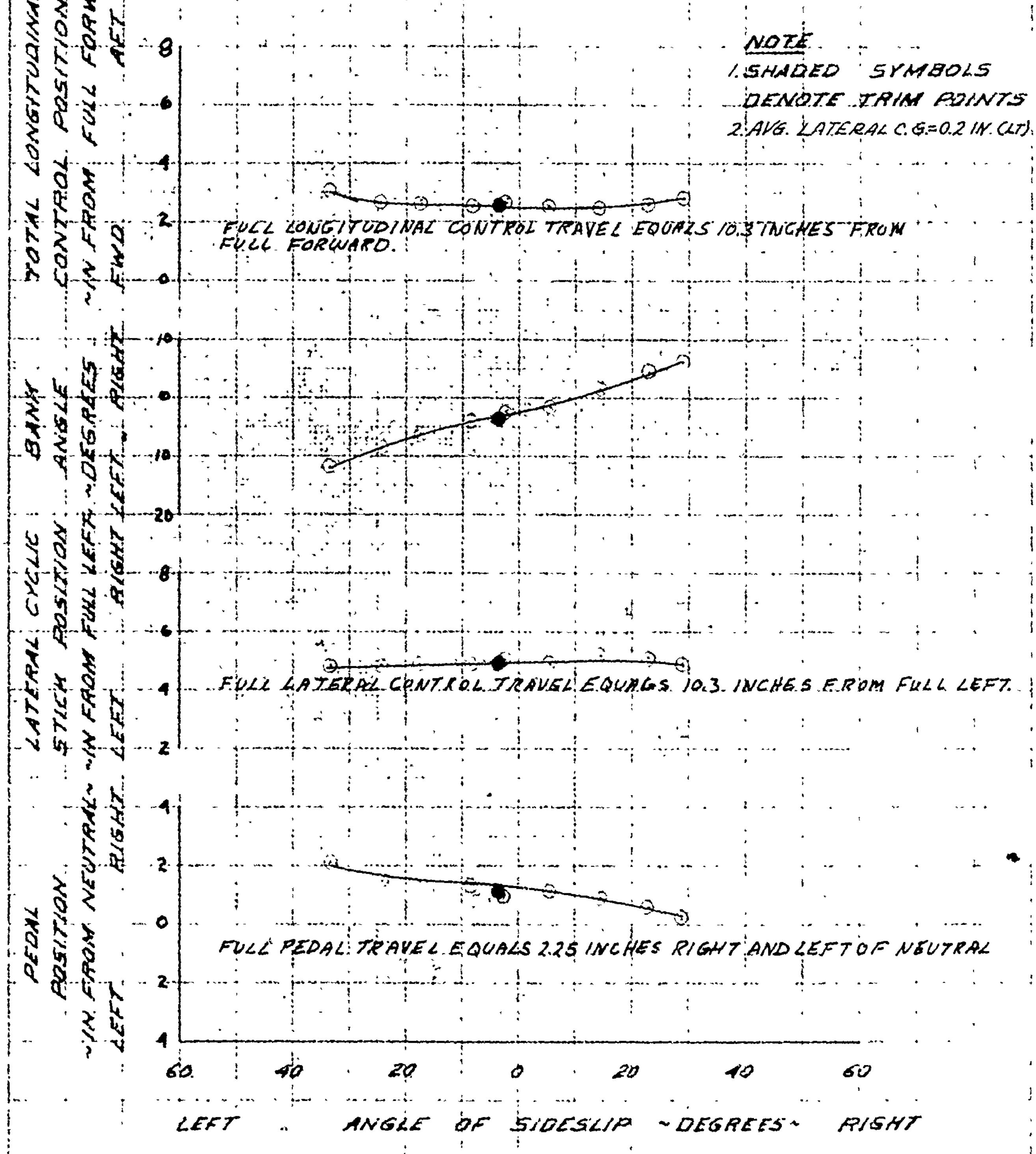

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FIGURE NO. 38

STATIC LATERAL - DIRECTIONAL STABILITY

OH-5A USA S/N 62-4209

AUTOROTATION

AVG GROSS WEIGHT = 2650 LB AVG CG LOCATION = 101.2 (AFT)

AVG DENSITY ALTITUDE = 5000 FT ROTOR RPM = 368

CALIBRATED AIRSPEED = 65 KNOTS

CLEAN CONFIGURATION

SAS ON

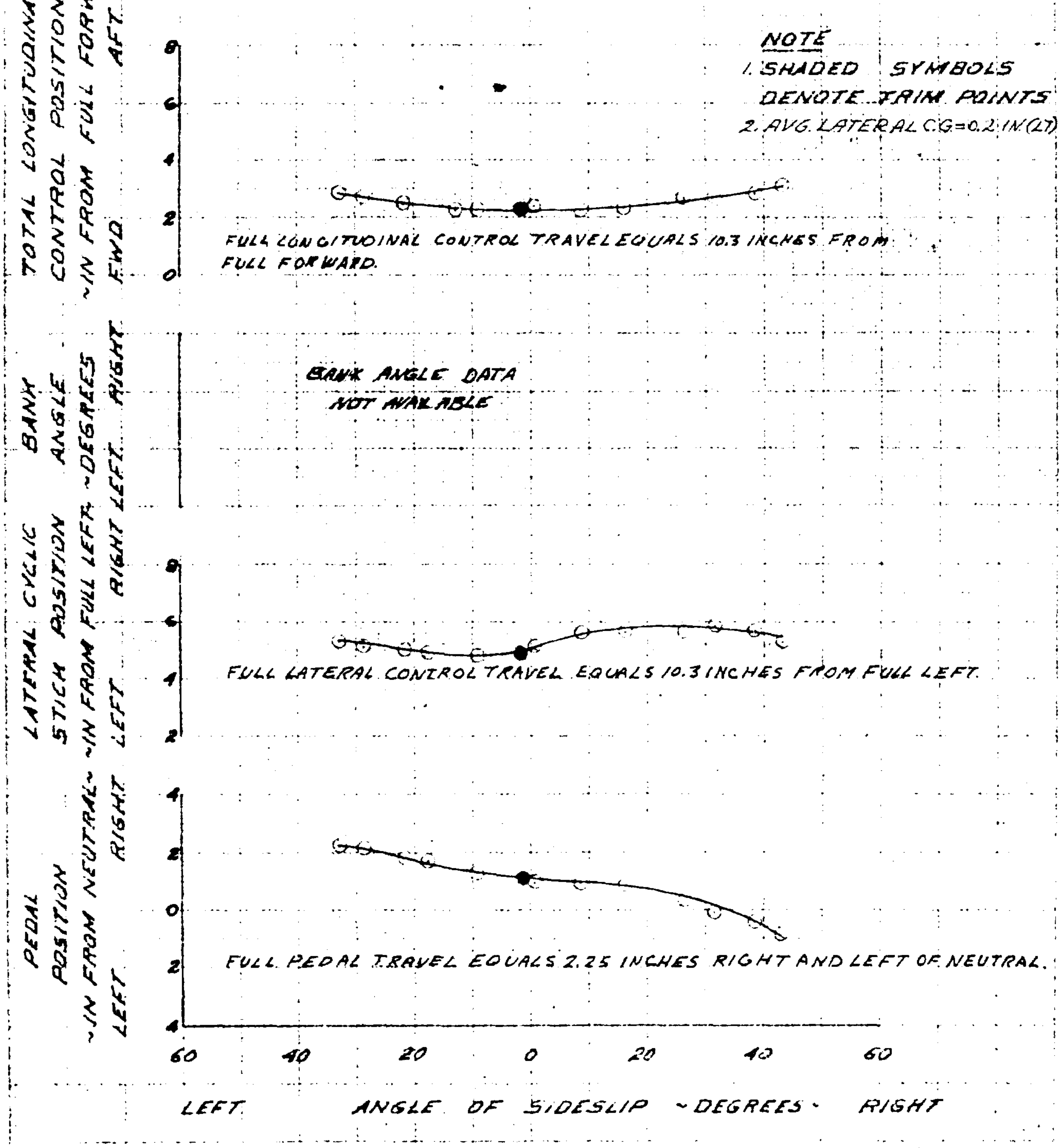

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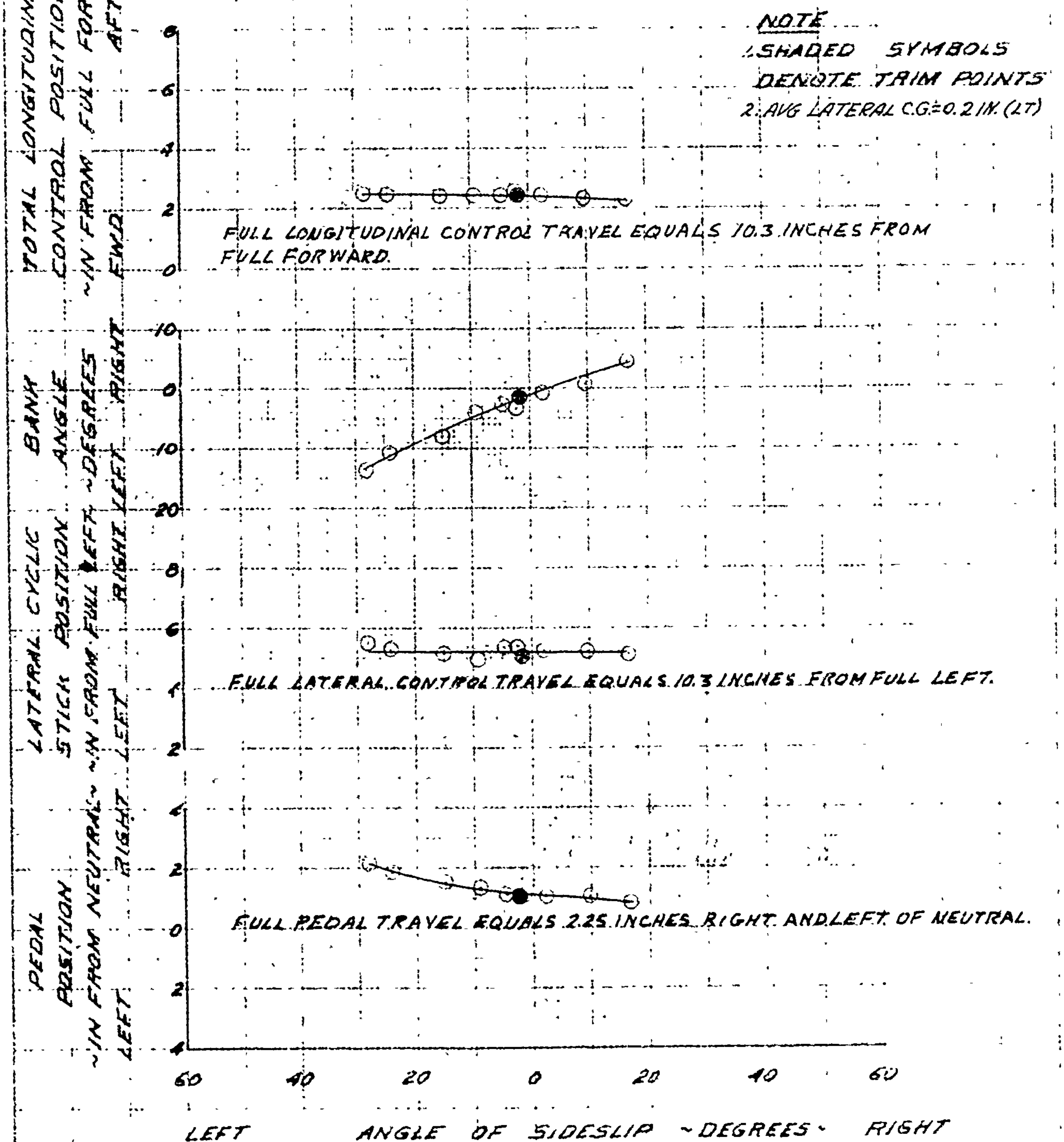
FIGURE No. 39

STATIC LATERAL - DIRECTIONAL STABILITY
OH-5A USA S/N 62-4209
AUTOROTATION

AVG GROSS WEIGHT = 2610 LB. AVG CG LOCATION = 101.3 (AFT)
AVG DENSITY ALTITUDE = 5000 FT ROTOR RPM = 368
CALIBRATED AIRSPEED = 62 KNOTS
CLEAN CONFIGURATION
SAS OFF



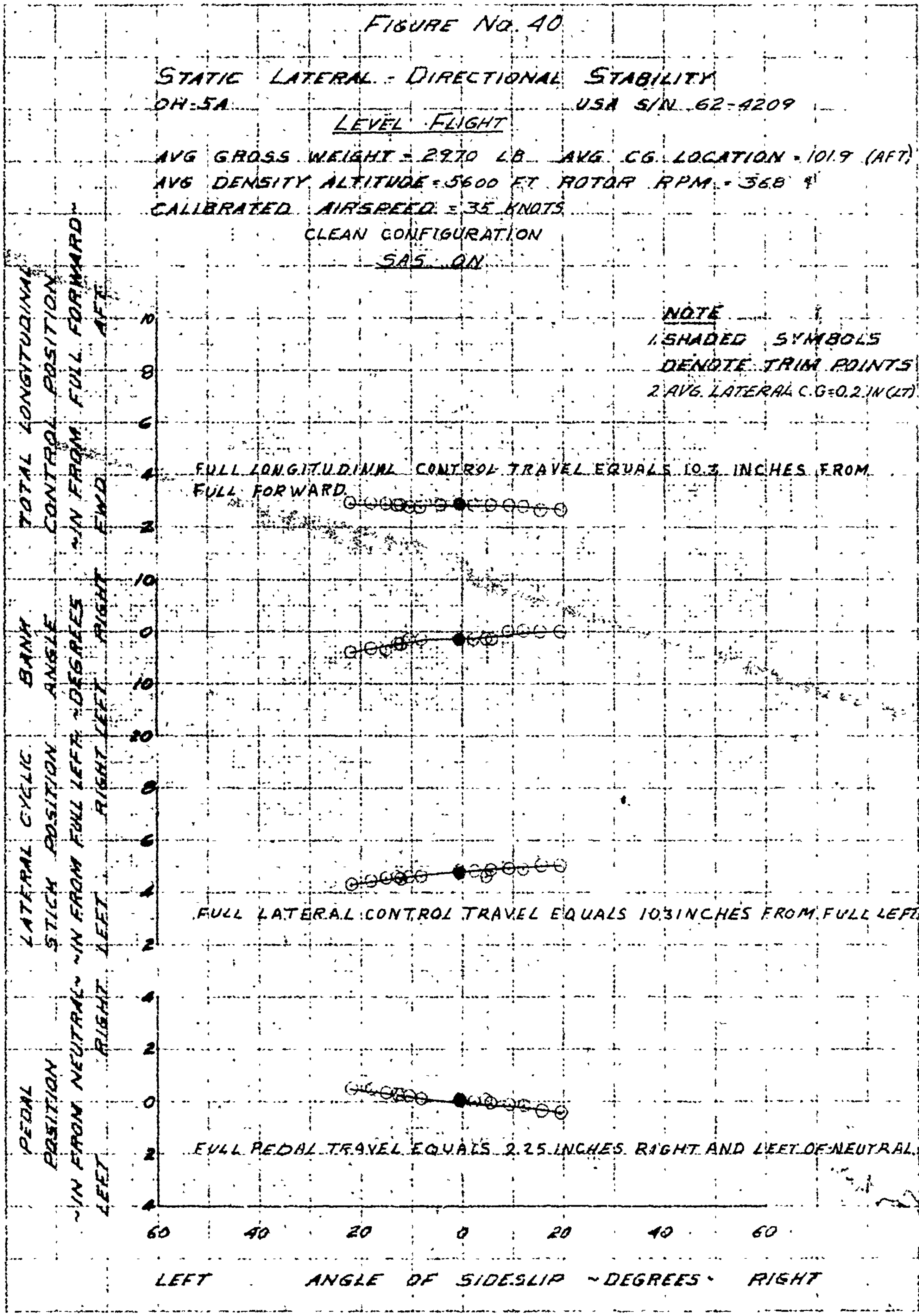


FIGURE No. 40
STATIC LATERAL - DIRECTIONAL STABILITY
OH-5A USA S/N 62-4209
LEVEL FLIGHT
AVG GROSS WEIGHT = 2970 LB AVG CG LOCATION = 101.9 (AFT)
AVG DENSITY ALTITUDE = 5600 FT ROTOR RPM = 368
CALIBRATED AIRSPEED = 35 KNOTS
CLEAN CONFIGURATION
SAS ON
NOTE
1. SHADED SYMBOLS DENOTE TRIM POINTS
2. AVG. LATERAL C.G = 0.2 IN (LT)
TOTAL LONGITUDINAL CONTROL POSITION ~IN FROM FULL FORWARD
FWD AFT
FULL LONGITUDINAL CONTROL TRAVEL EQUALS 10.3 INCHES FROM FULL FORWARD
BANK ANGLE ~DEGREES
LEFT RIGHT
LATERAL CYCLIC STICK POSITION ~IN FROM FULL LEFT
LEFT RIGHT
FULL LATERAL CONTROL TRAVEL EQUALS 10.3 INCHES FROM FULL LEFT
PEDAL POSITION ~IN FROM NEUTRAL~
LEFT RIGHT
FULL PEDAL TRAVEL EQUALS 2.25 INCHES RIGHT AND LEFT OF NEUTRAL
60 40 20 0 20 40 60
LEFT ANGLE OF SIDESLIP ~DEGREES~ RIGHT

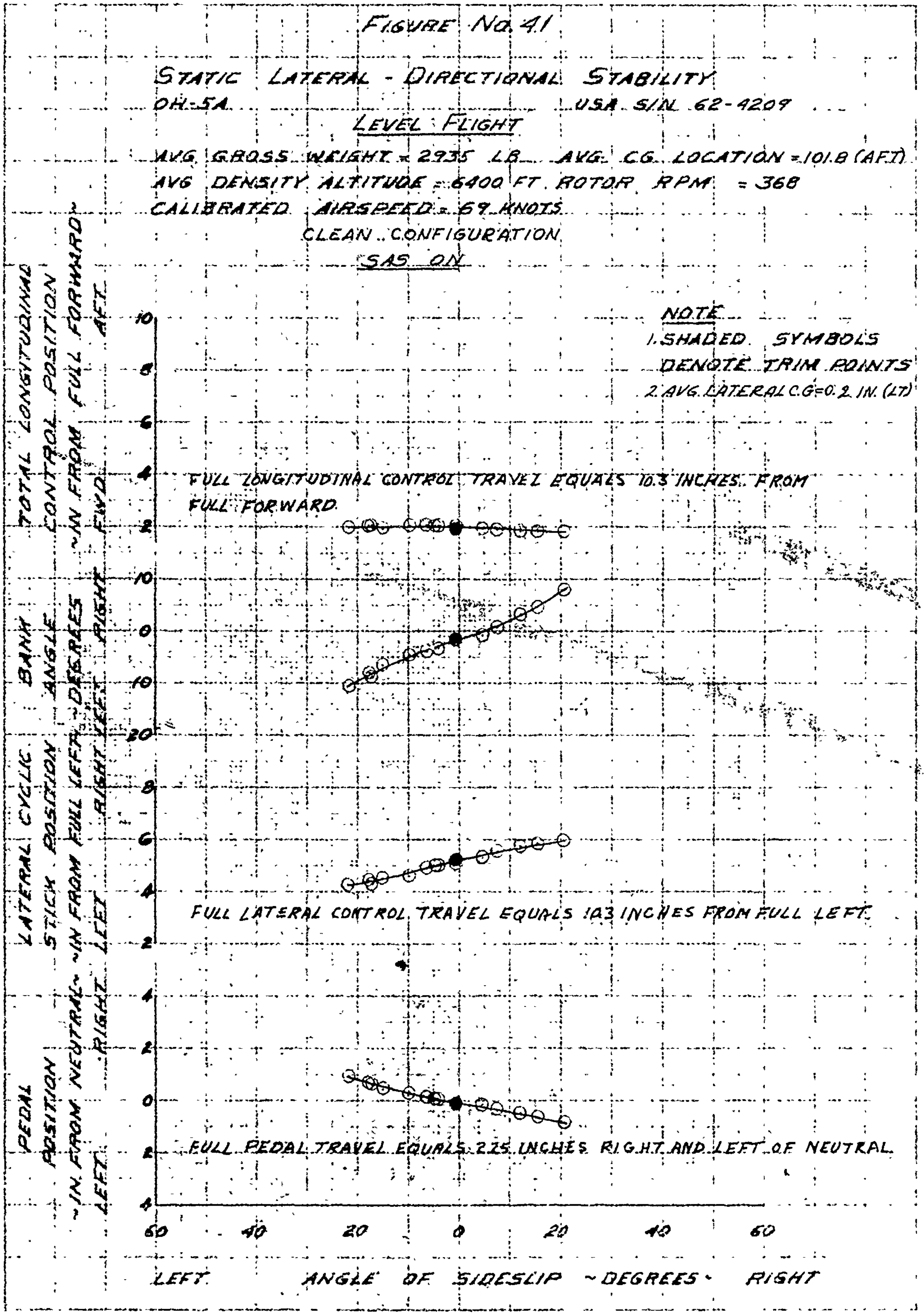


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FIGURE NO. 42

STATIC LATERAL - DIRECTIONAL STABILITY

OH-5A USA S/N 62-4209

LEVEL FLIGHT

AVG GROSS WEIGHT = 2980 LB. AVG. CG. LOCATION = 101.8 (AFT)

AVG DENSITY ALTITUDE = 6100 FT ROTOR RPM = 368

CALIBRATED AIRSPEED = 83 KNOTS

CLEAN CONFIGURATION

SAS ON

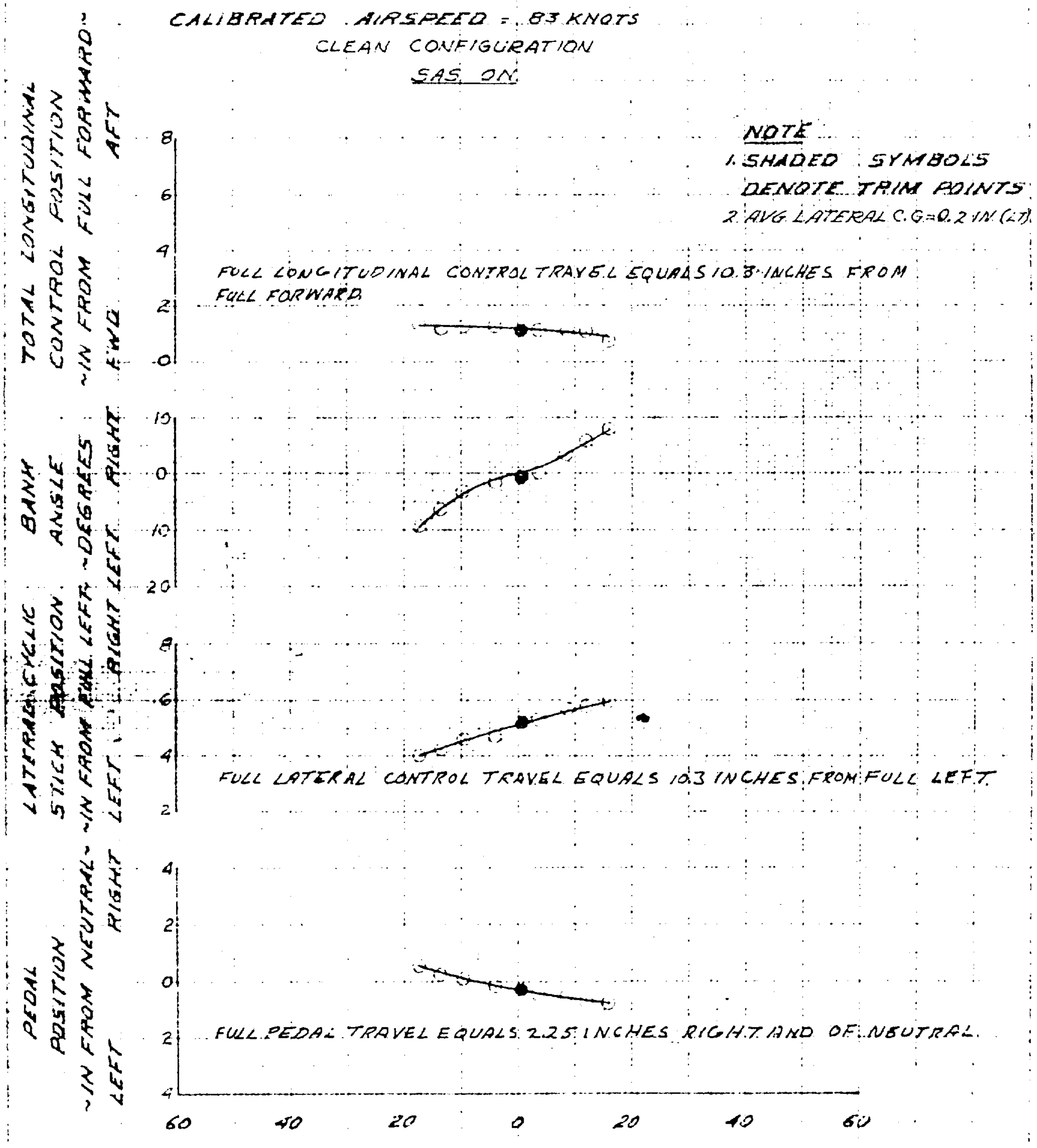

FIGURE NO. 43

STATIC LATERAL - DIRECTIONAL STABILITY

OH-5A USA S/N 62-4209

CLIMB (MAX. CONT. POWER)

AVG GROSS WEIGHT = 2880 LB AVG. CG. LOCATION = 101.7 (AFT)

AVG DENSITY ALTITUDE = 5000 FT ROTOR RPM = 368

CALIBRATED AIRSPEED = 48 KNOTS

CLEAN CONFIGURATION

SAS ON

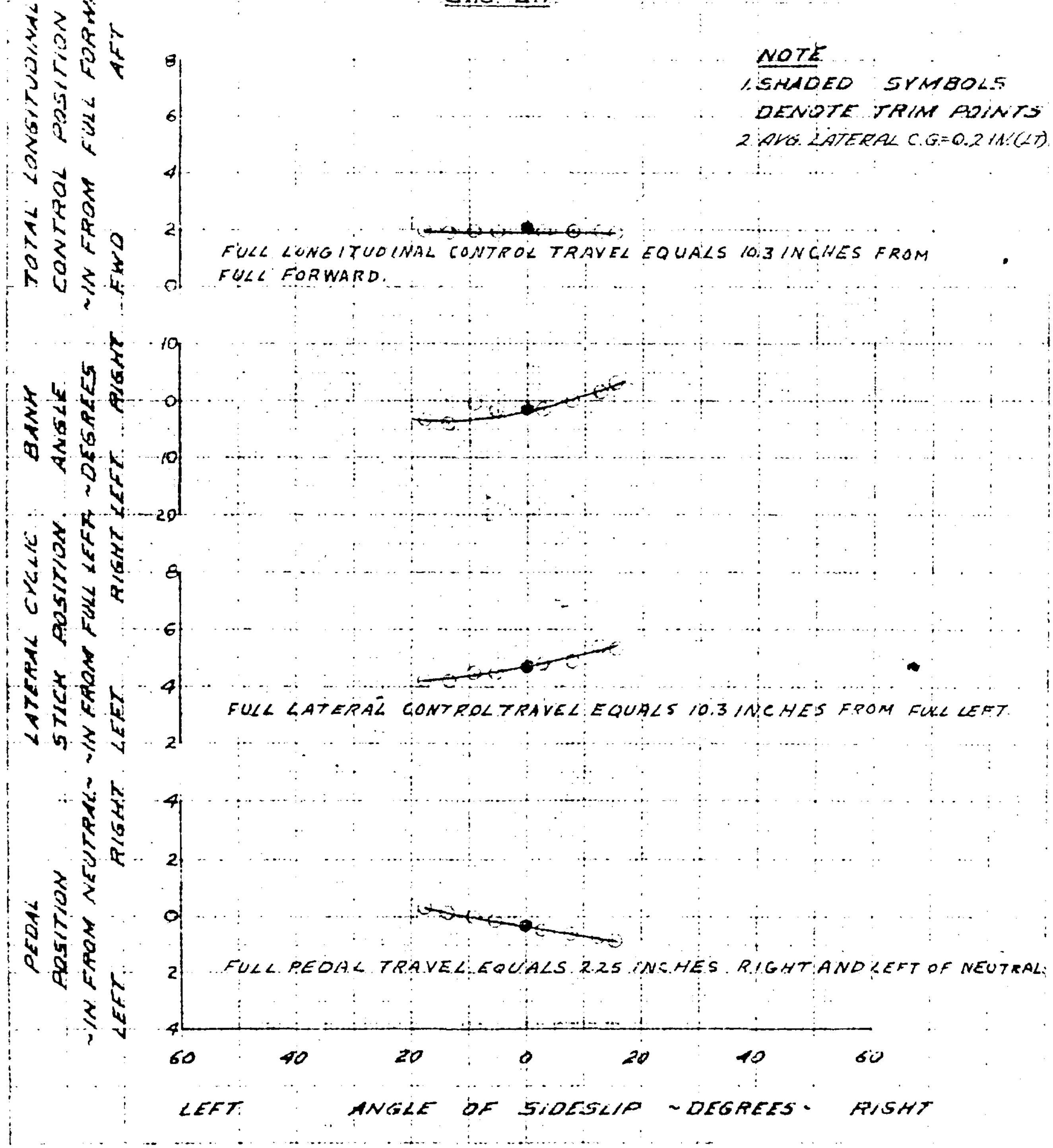

FIGURE No. 44

STATIC LATERAL - DIRECTIONAL STABILITY

OH-5A USA S/N 62-4209

AUTOROTATION

AVG GROSS WEIGHT = 2920 LB. AVG. CG. LOCATION = 101.8 (AFT)

AVG DENSITY ALTITUDE = 5000 FT. ROTOR RPM = 368

CALIBRATED AIRSPEED = 70 KNOTS

CLEAN CONFIGURATION

SAS ON

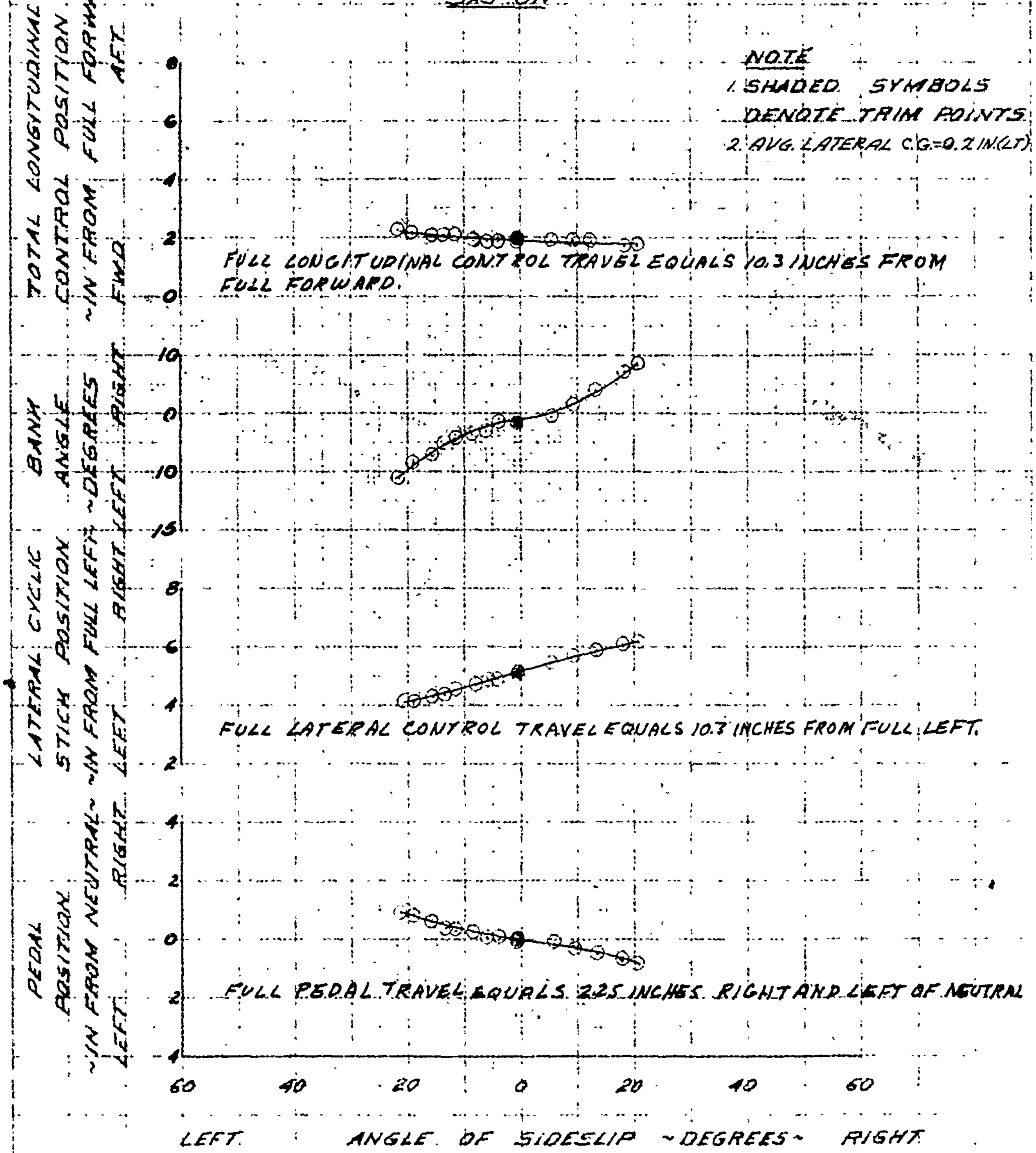

FIGURE No. 45

STATIC LATERAL - DIRECTIONAL STABILITY

OH-5A USA S/N 62-4209

LEVEL FLIGHT

AVG GROSS WEIGHT = 2620 LB AVG CG. LOCATION = 101.3 (AFT)
AVG DENSITY ALTITUDE = 10 900 FT ROTOR RPM = 368
CALIBRATED AIRSPEED = 35 KNOTS
CLEAN CONFIGURATION
SAS ON

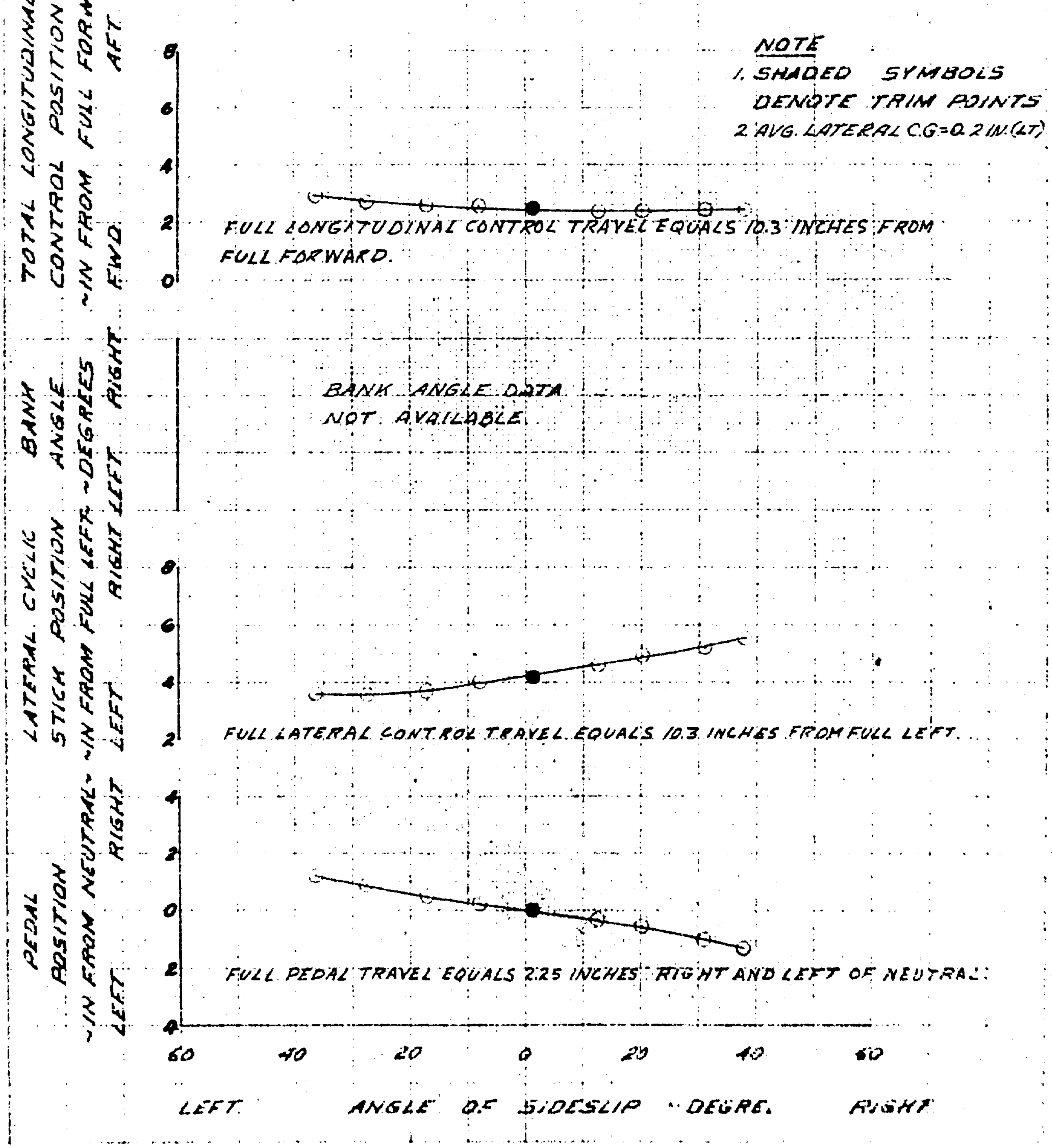

FIGURE No. 46

STATIC LATERAL - DIRECTIONAL STABILITY

OH-5A USA S/N 62-4209

LEVEL FLIGHT

AVG GROSS WEIGHT = 2660 LB AVG CG LOCATION = 101.3 (AFT)
AVG DENSITY ALTITUDE = 10,800 FT ROTOR RPM = 368
CALIBRATED AIRSPEED = 61 KNOTS
CLEAN CONFIGURATION
SAS ON

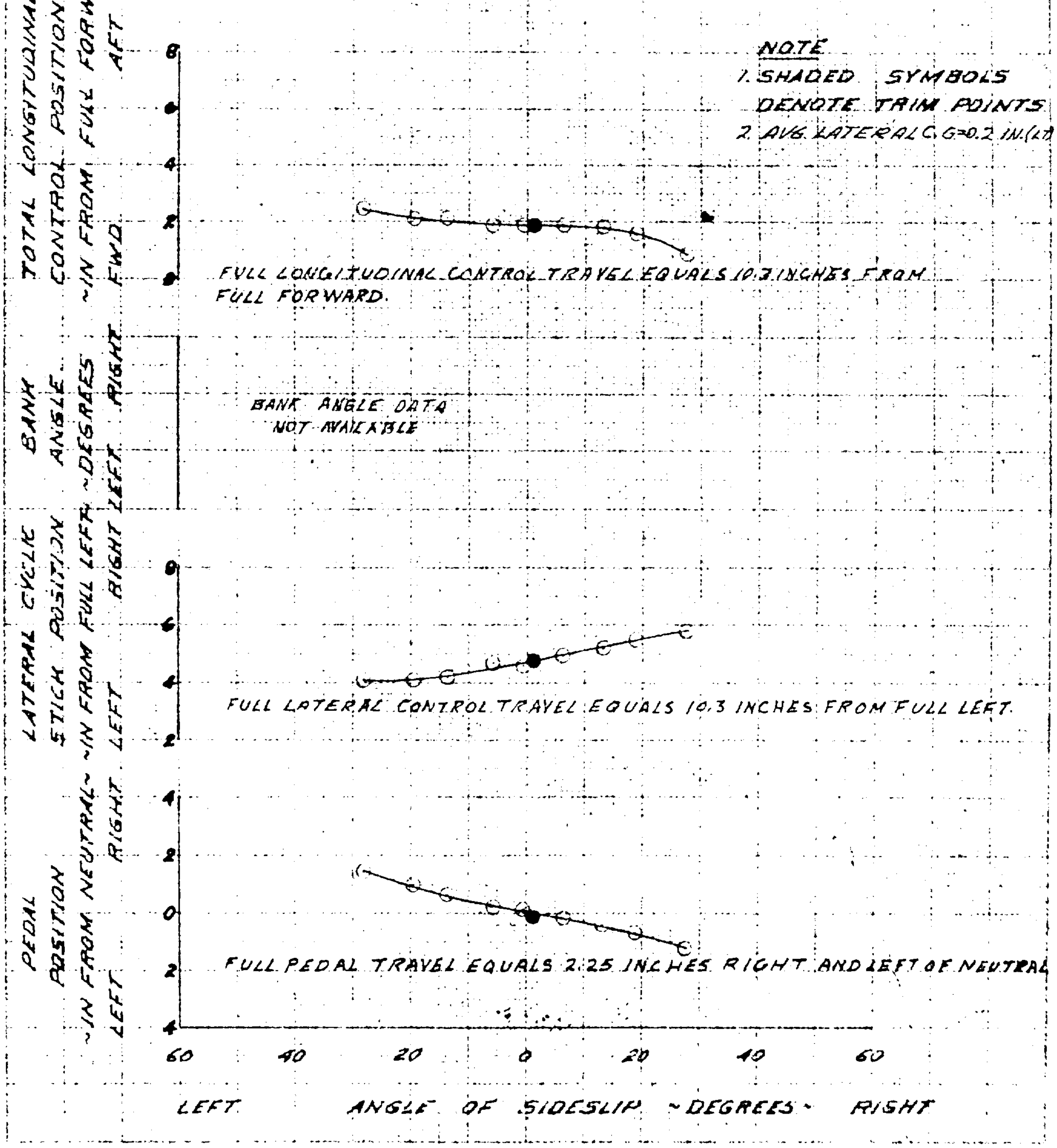

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FIGURE No. 47

STATIC LATERAL - DIRECTIONAL STABILITY

OH-5A USA S/N 62-4209

LEVEL FLIGHT

AVG GROSS WEIGHT = 2660 LB. AVG CG LOCATION = 101.4 (AFT)

AVG DENSITY ALTITUDE = 10800 FT ROTOR RPM = 368

CALIBRATED AIRSPEED = 75 KNOTS

CLEAN CONFIGURATION

SAS ON

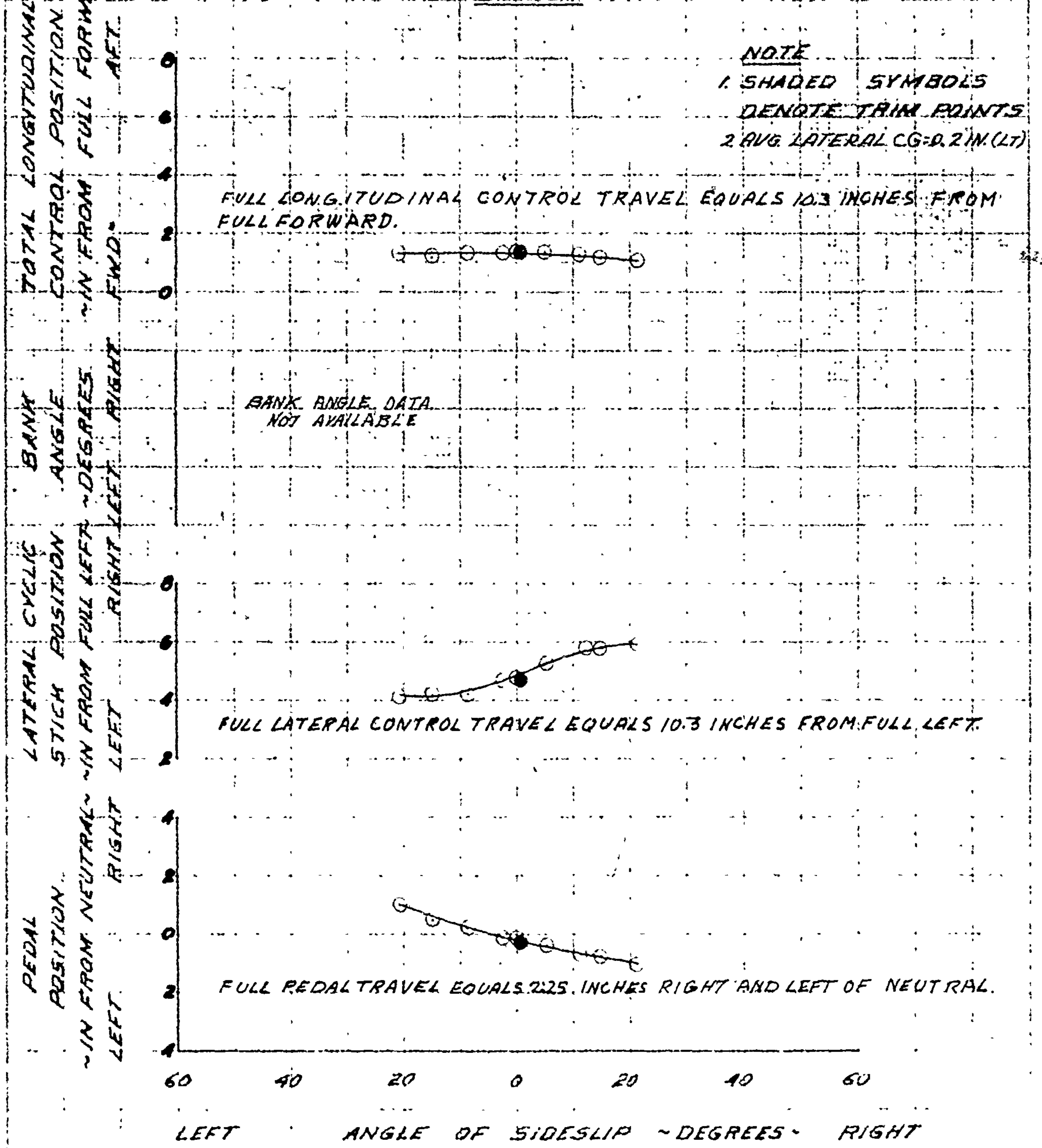

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FIGURE NO. 48

STATIC LATERAL - DIRECTIONAL STABILITY

OH-5A USA S/N 62-4209

CLIMB (MAX. CONT. POWER)

AVG GROSS WEIGHT = 2720 LB AVG. CG. LOCATION = 101.4 (AFT)

AVG DENSITY ALTITUDE = 10 000 FT ROTOR RPM = 368

CALIBRATED AIRSPEED = 46 KNOTS

CLEAN CONFIGURATION

SAS ON

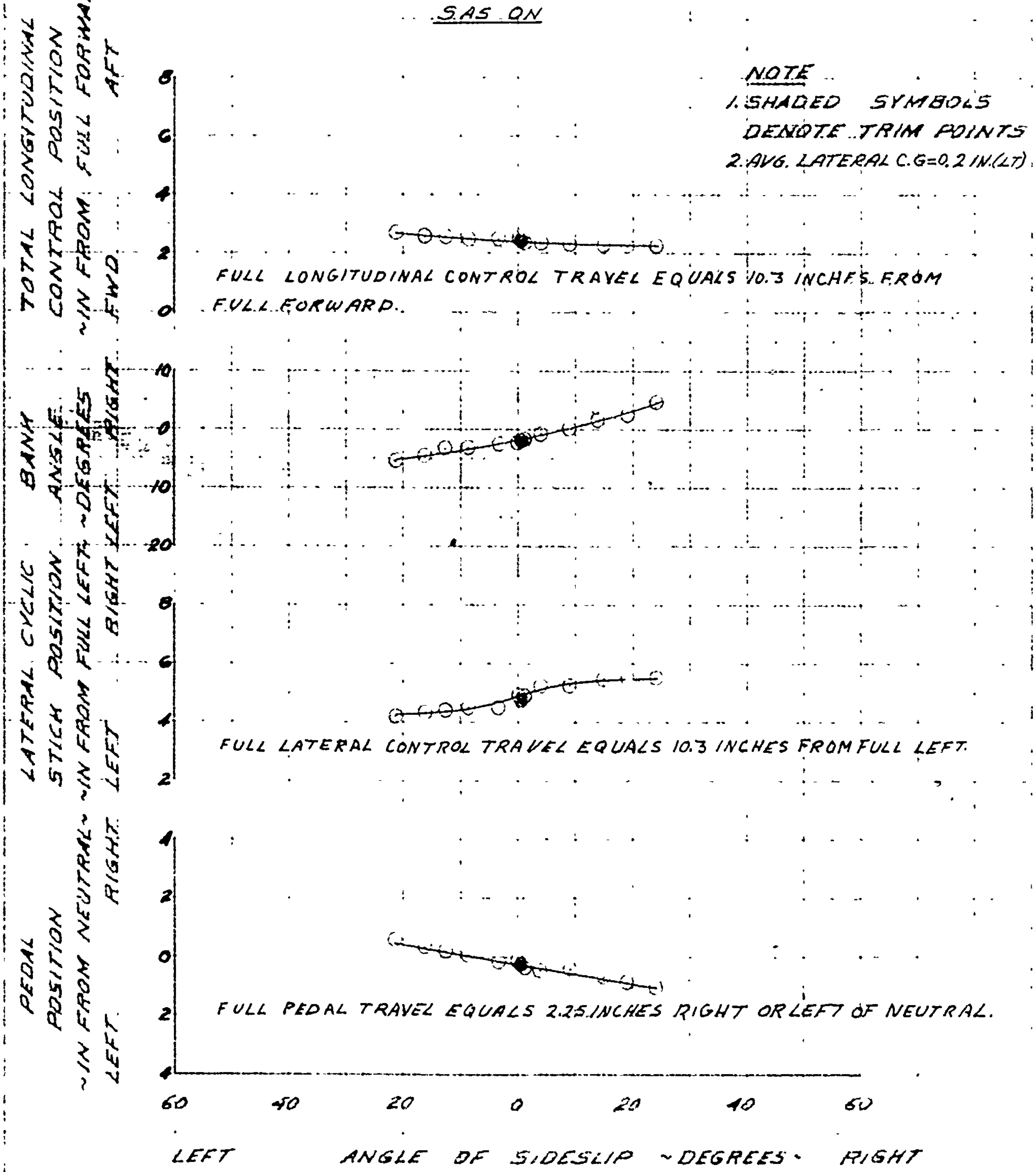


FIGURE NO. 49

STATIC LATERAL - DIRECTIONAL STABILITY

OH-5A USA S/N 62-4209

AUTOROTATION

AVG GROSS WEIGHT = 2700 LB AVG C.G. LOCATION = 101.4 (AFT)

AVG DENSITY ALTITUDE = 10000 FT ROTOR RPM = 368

CALIBRATED AIRSPEED = 51 KNOTS

CLEAN CONFIGURATION

SAS ON

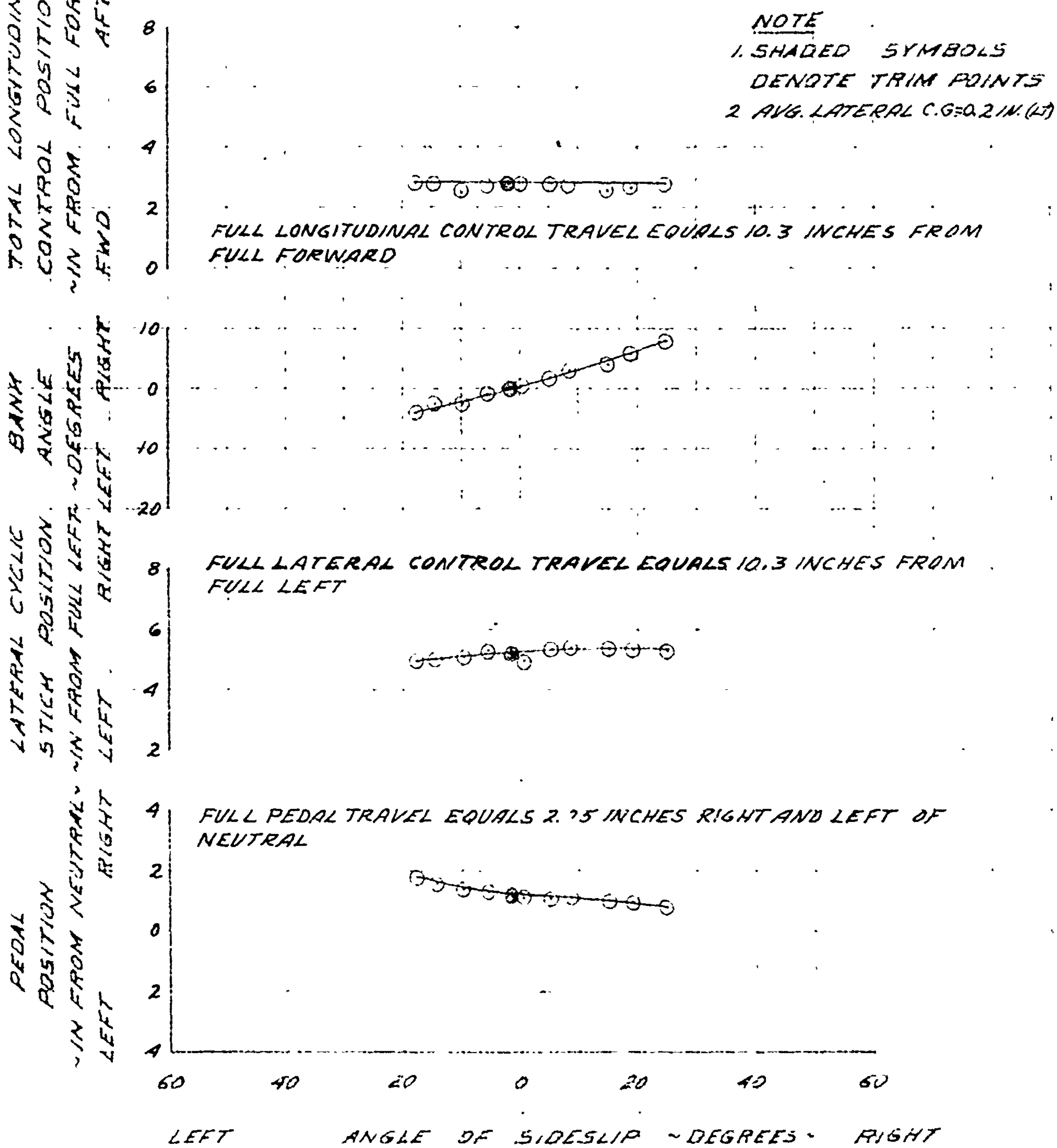


FIGURE No. 50

STATIC LATERAL - DIRECTIONAL STABILITY

OH-5A USA S/N 62-4210

LEVEL FLIGHT

AVG GROSS WEIGHT = 2710 LB AVG CG LOCATION = 101.1 (AFT)
AVG DENSITY ALTITUDE = 5100 FT ROTOR RPM = 368
CALLIBRATED AIRSPEED = 35 KNOTS

XM-7 INSTALLED

SAS ON

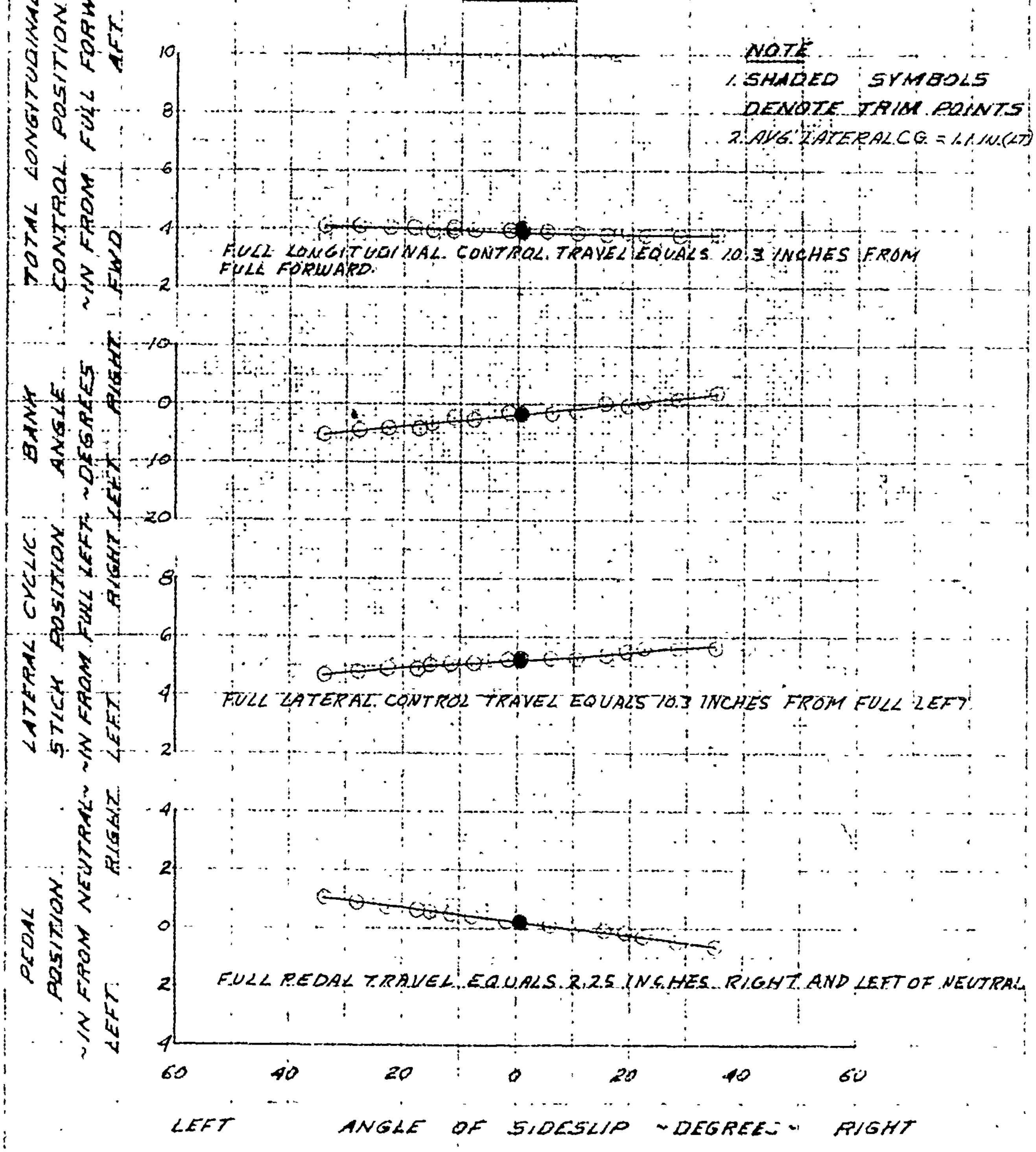


FIGURE No. 51

STATIC LATERAL - DIRECTIONAL STABILITY

OH-5A USA S/N 62-4210

LEVEL FLIGHT

AVG GROSS WEIGHT = 2660 LB AVG CG LOCATION = 101.1 (AFT)
AVG DENSITY ALTITUDE = 4900 FT ROTOR RPM = 368
CALIBRATED AIRSPEED = 76 KNOTS
XM-7 INSTALLED
SAS ON

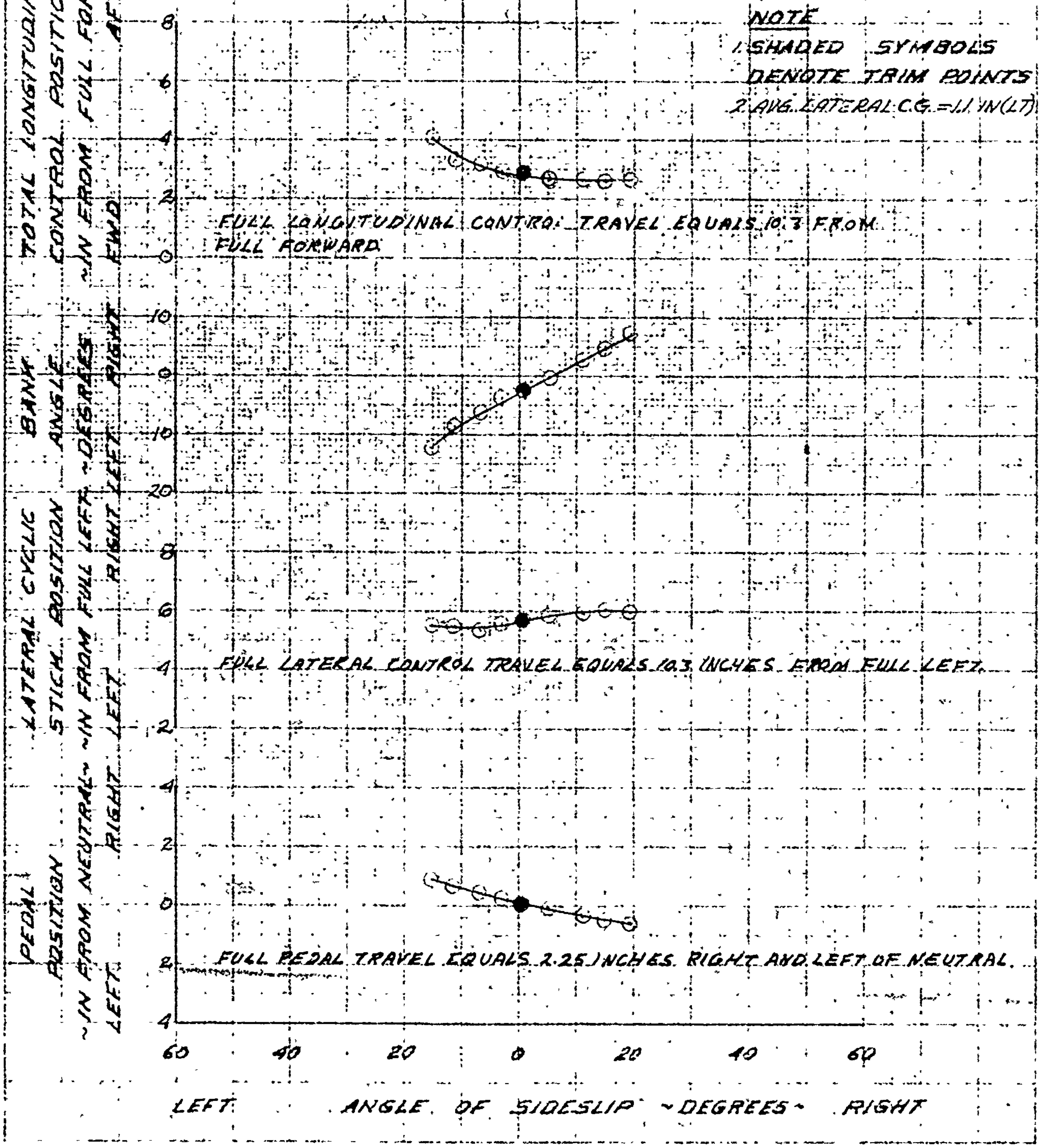


FIGURE No. 52

STATIC LATERAL - DIRECTIONAL STABILITY

OH-5A USA S/N 62-4210

CLIMB (MAX. CONT. POWER)

AVG GROSS WEIGHT = 2630 LB AVG CG LOCATION = 101.0 (AFT)

AVG DENSITY ALTITUDE = 5000 FT ROTOR RPM = 368

CALIBRATED AIRSPEED = 48.5 KNOTS

XM-7 INSTALLED

SAS ON

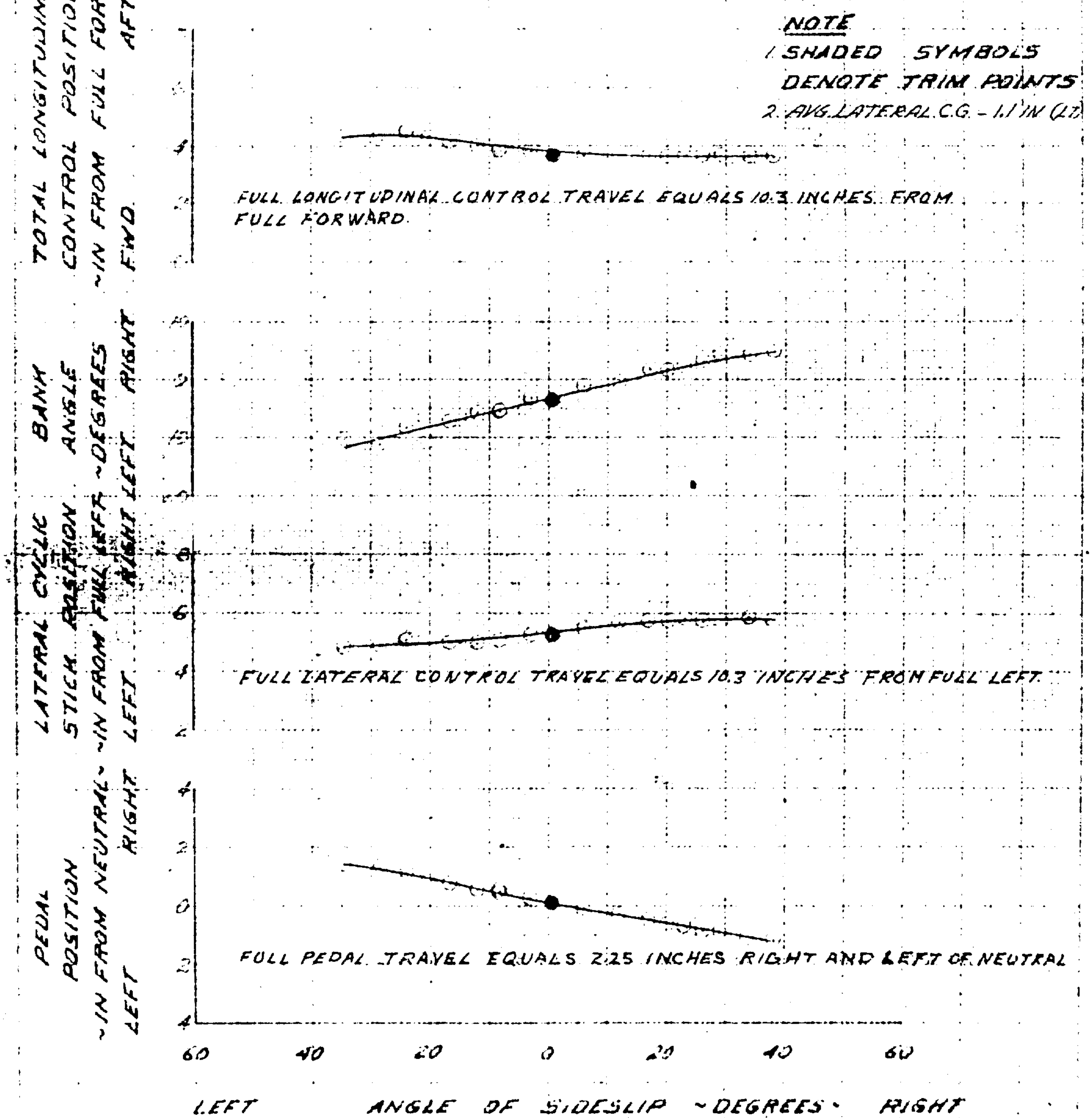


FIGURE NO. 53

STATIC LATERAL - DIRECTIONAL STABILITY

OH-5A USA S/N 62-4210

AUTOROTATION

AVG GROSS WEIGHT = 2630 LB AVG. C.G. LOCATION = 101.0 (AFT)

AVG DENSITY ALTITUDE = 5000 FT ROTOR RPM = 362

CALIBRATED AIRSPEED = 55.5 KNOTS

XM-7 INSTALLED

SAS ON

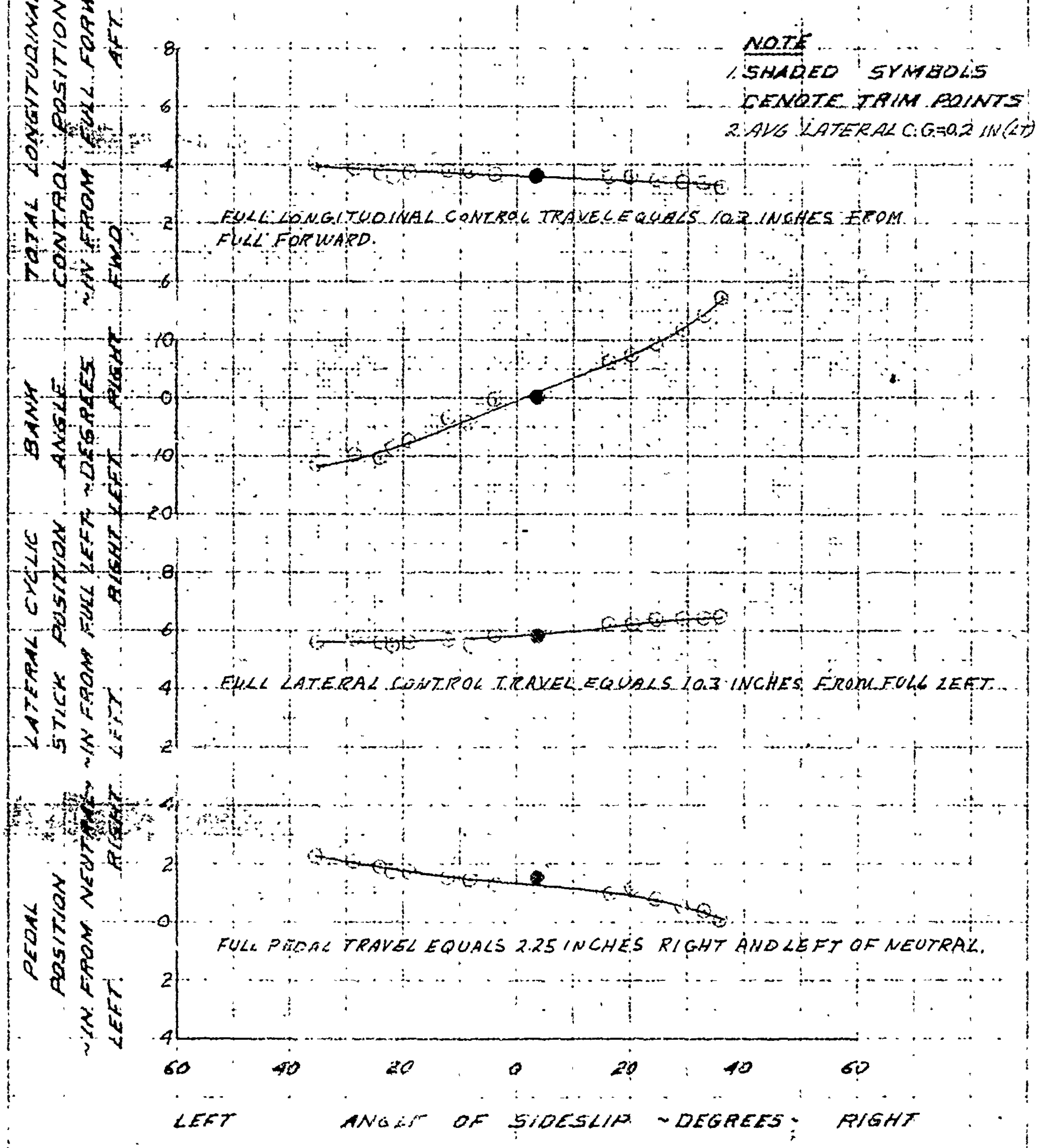


FIGURE No. 54

STATIC LATERAL - DIRECTIONAL STABILITY

OH-5A USA S/N 62-4210

LEVEL FLIGHT

AVG GROSS WEIGHT = 2685 LB AVG C.G. LOCATION = 101.1 (AFT)

AVG DENSITY ALTITUDE = 6100 FT ROTOR RPM = 368

CALIBRATED AIRSPEED = 35 KNOTS

XM-8 INSTALLED

SAS ON

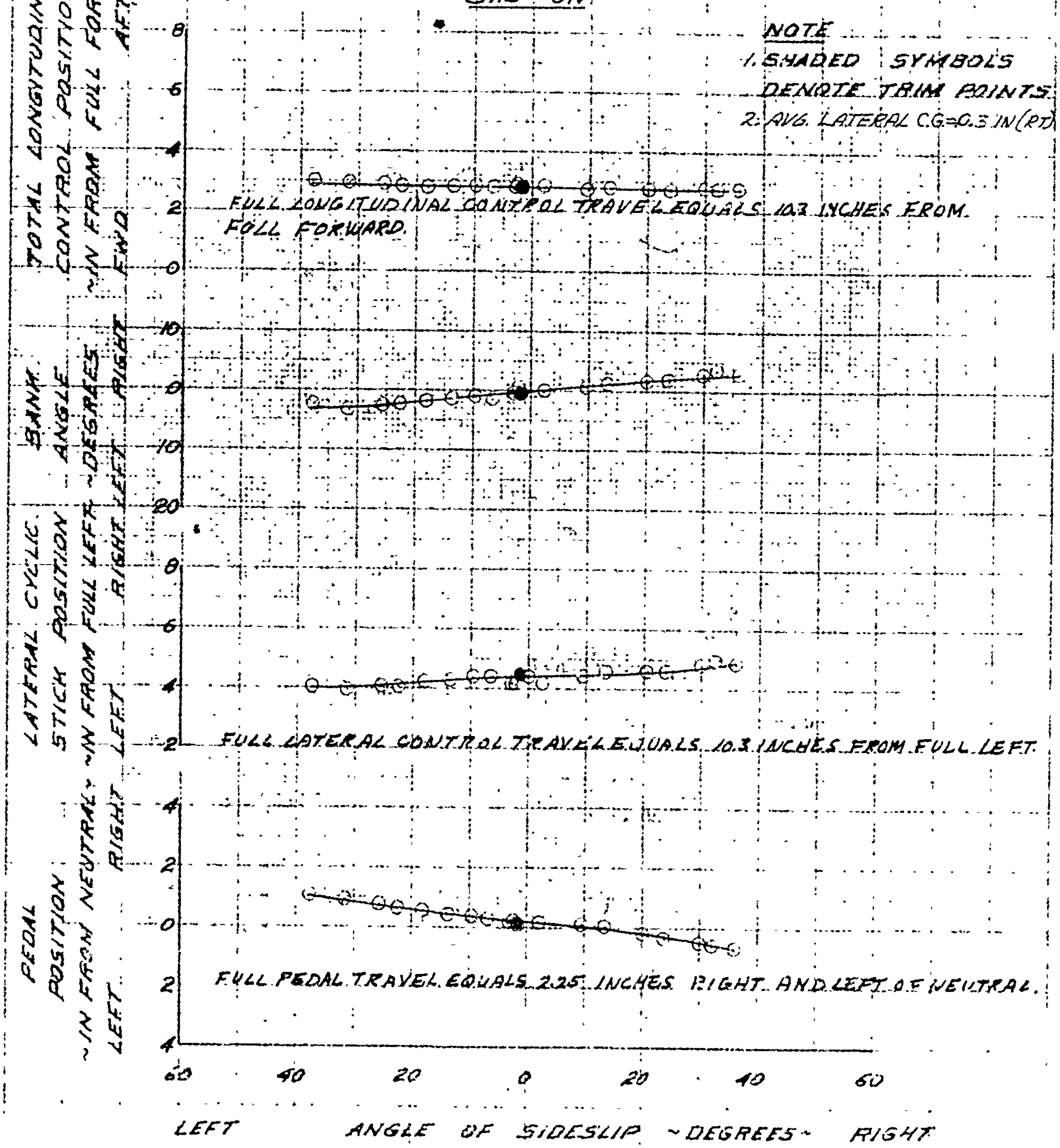


FIGURE NO. 55

STATIC LATERAL - DIRECTIONAL STABILITY

OH-5A USA S/N 62-4210

LEVEL FLIGHT

AVG GROSS WEIGHT = 2680 LB AVG CG LOCATION = 101.1 (AFT)

AVG DENSITY ALTITUDE = 7000 FT ROTOR RPM = 368

CALIBRATED AIRSPEED = 76.5 KNOTS

XM-8 INSTALLED

SAS ON

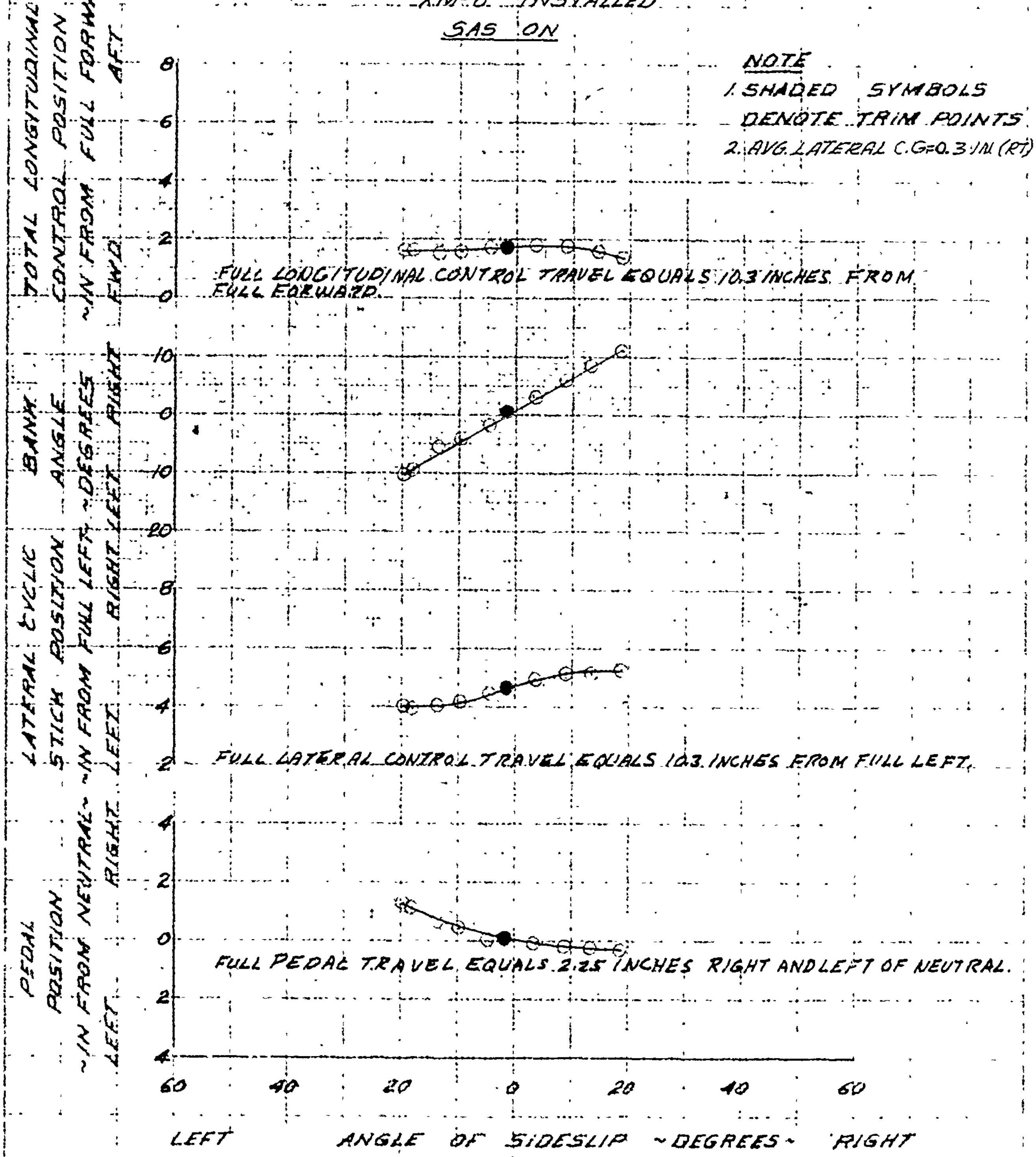


FIGURE No. 56

STATIC LATERAL - DIRECTIONAL STABILITY

OH-5A USA S/N 62-4210

CLIMB (MAX. CONT. POWER)

AVG GROSS WEIGHT = 2625 LB. AVG C.G. LOCATION = 101.1 (AFT)

AVG DENSITY ALTITUDE = 5000 FT ROTOR RPM = 368

CALIBRATED AIRSPEED = 48 KNOTS

XM-8 INSTALLED

SAS ON

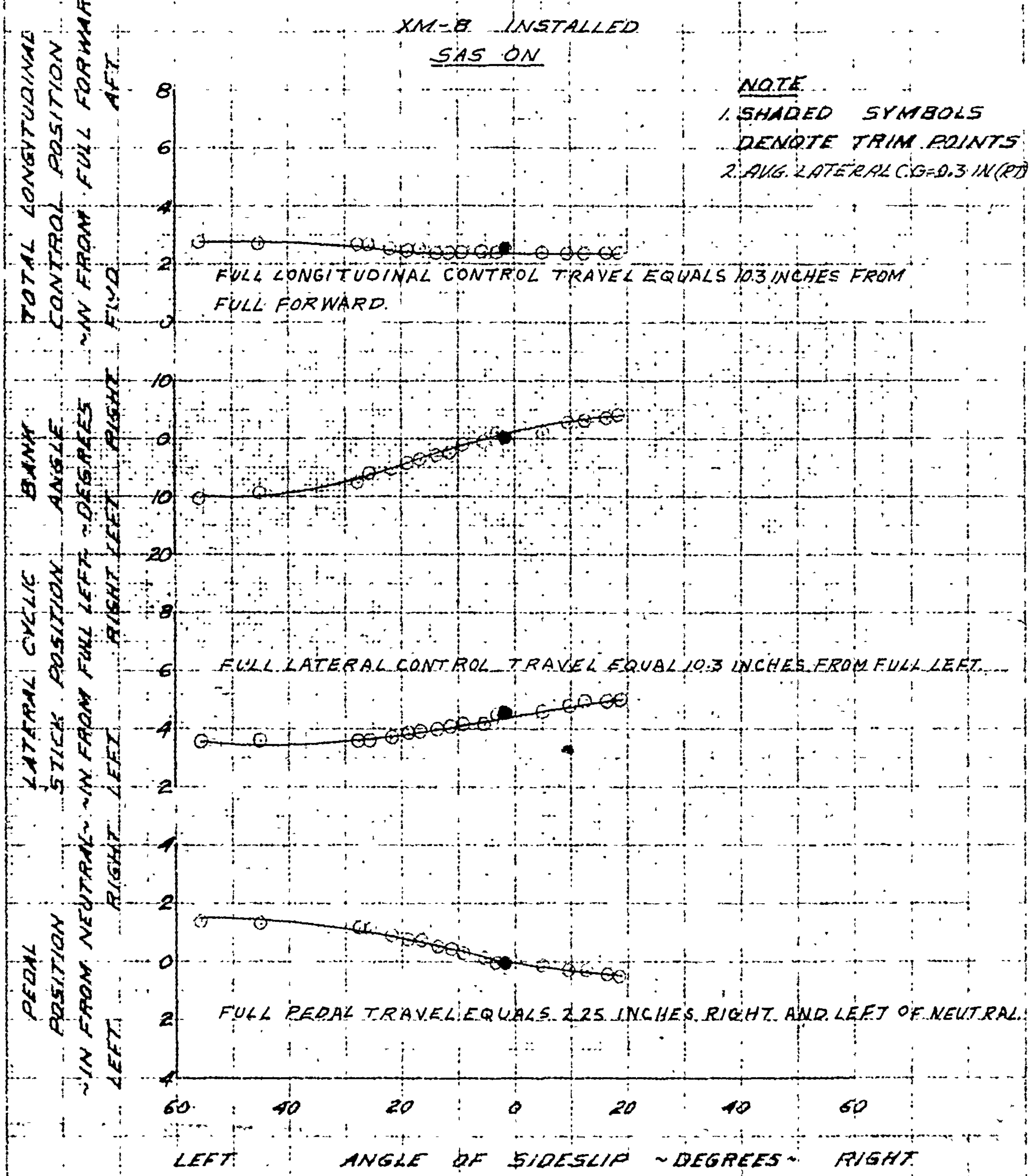


FIGURE No. 57

STATIC LATERAL - DIRECTIONAL STABILITY

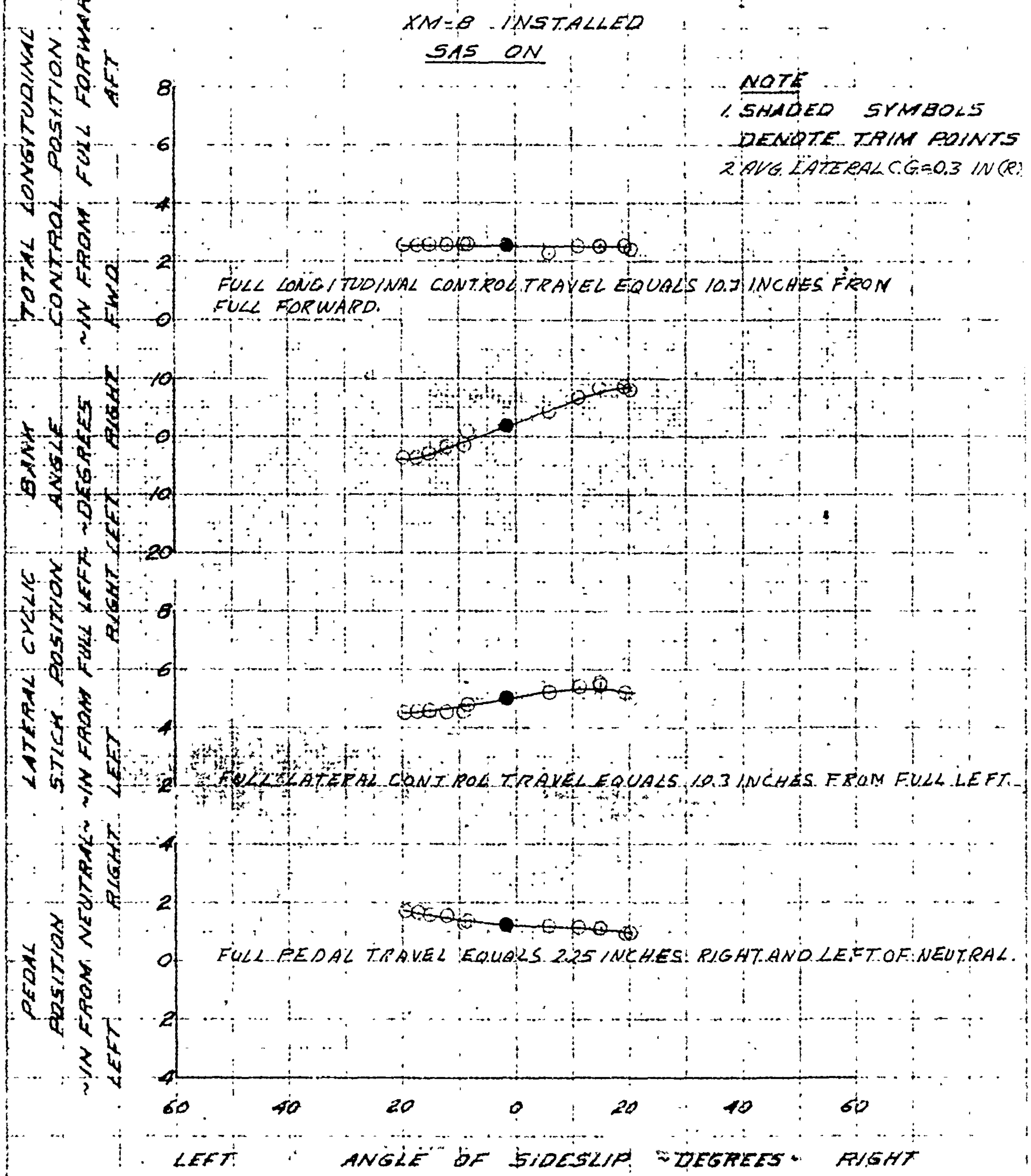
OH-5A USA S/N 62-4210

AUTOROTATION

AVG GROSS WEIGHT = 2605 LB. AVG. CG. LOCATION = 101.1 (AFT)

AVG DENSITY ALTITUDE = 5000 FT ROTOR RPM = 368

CALIBRATED AIRSPEED = 55.5 KNOTS



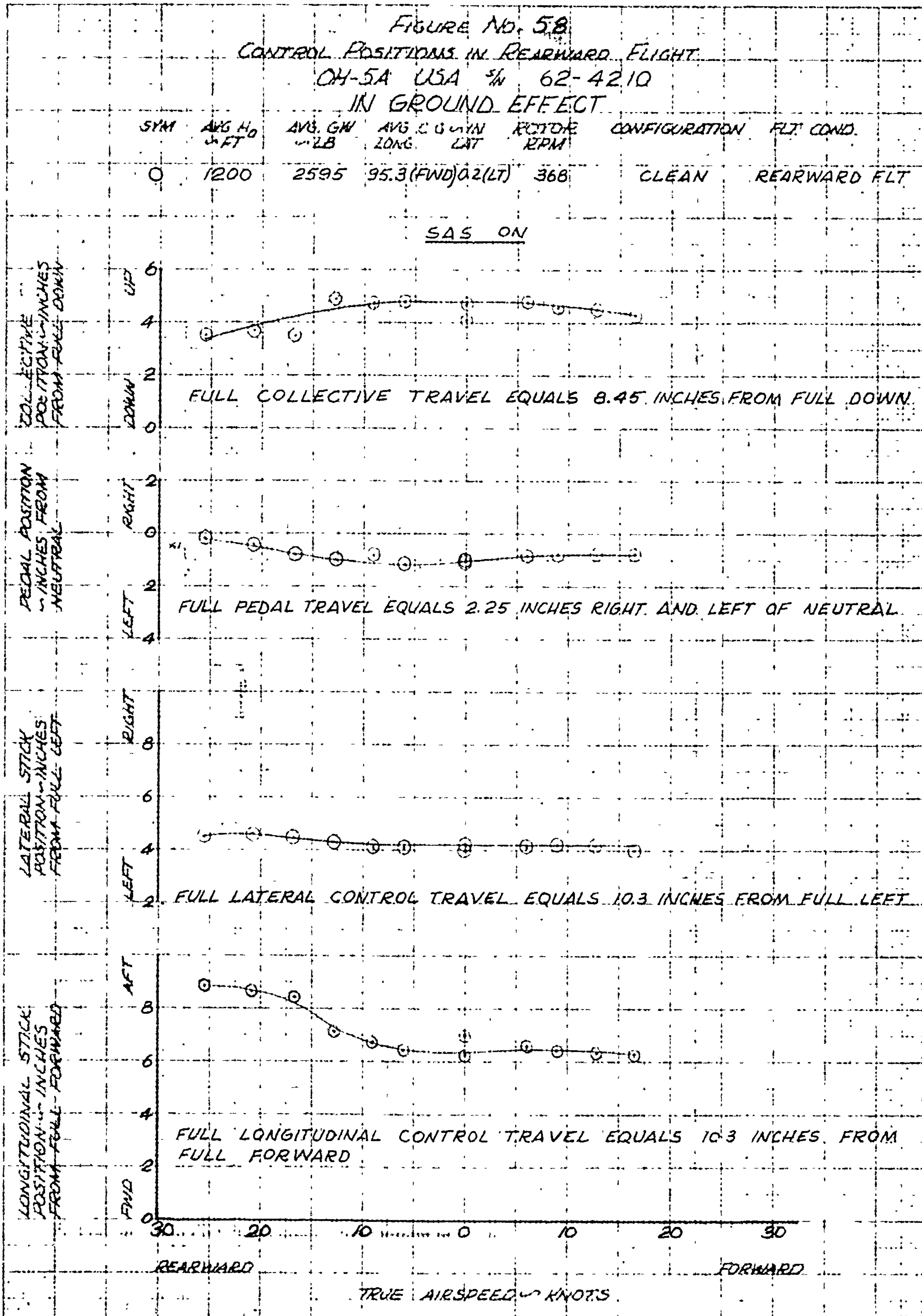


FIGURE No. 58
CONTROL POSITIONS IN REARWARD FLIGHT
OH-5A USA S/N 62-4210
IN GROUND EFFECT
SYM | AVG H_O ~FT | AVG. GW ~LB | AVG C.G ~IN LONG | LAT | ROTOR RPM | CONFIGURATION | FLT COND.
○ | 1200 | 2595 | 95.3(FWD) | 0.2(LT) | 368 | CLEAN | REARWARD FLT
SAS ON
COLLECTIVE POSITION ~ INCHES FROM FULL DOWN
UP
DOWN
FULL COLLECTIVE TRAVEL EQUALS 8.45 INCHES FROM FULL DOWN
PEDAL POSITION ~ INCHES FROM NEUTRAL
RIGHT
LEFT
FULL PEDAL TRAVEL EQUALS 2.25 INCHES RIGHT AND LEFT OF NEUTRAL
LATERAL STICK POSITION ~ INCHES FROM FULL LEFT
RIGHT
LEFT
FULL LATERAL CONTROL TRAVEL EQUALS 10.3 INCHES FROM FULL LEFT
LONGITUDINAL STICK POSITION ~ INCHES FROM FULL FORWARD
AFT
FWD
FULL LONGITUDINAL CONTROL TRAVEL EQUALS 10.3 INCHES FROM FULL FORWARD
REARWARD
FORWARD
TRUE AIRSPEED ~ KNOTS

FIGURE NO. 59

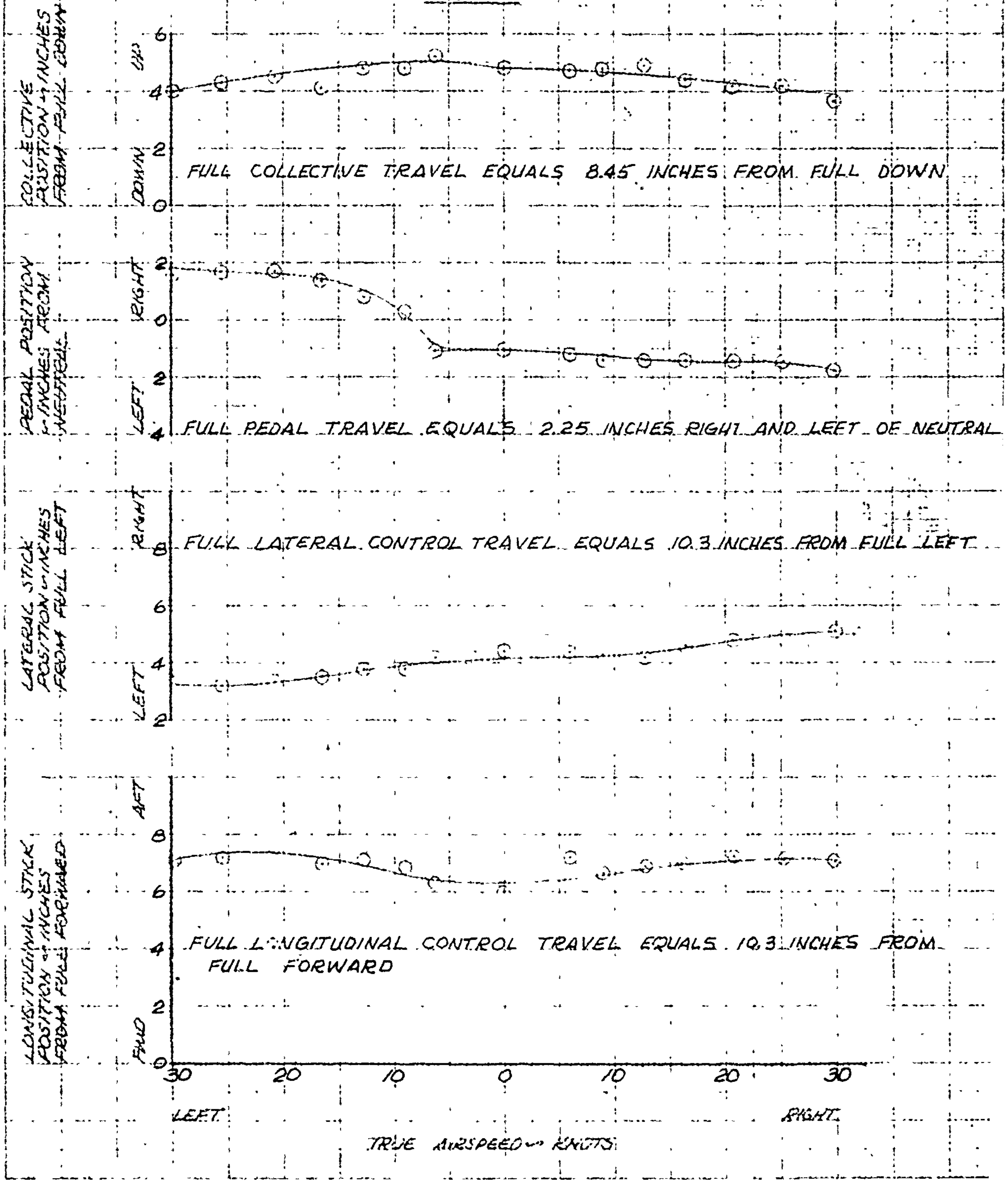
CONTROL POSITIONS IN SIDEWARD FLIGHT

OH-5A USA S/N 62-4210

IN GROUND EFFECT

SYM	AVG H_d ~FT	AVG G.W. ~LB	AVG CG ~IN LONG	AVG CG ~IN LAT	ROTOR RPM	CONFIGURATION	FLT. COND.
O	1100	2705	95.4(FWD)	0.2(LT)	368	CLEAN	SIDEWARD FLT

SAS ON



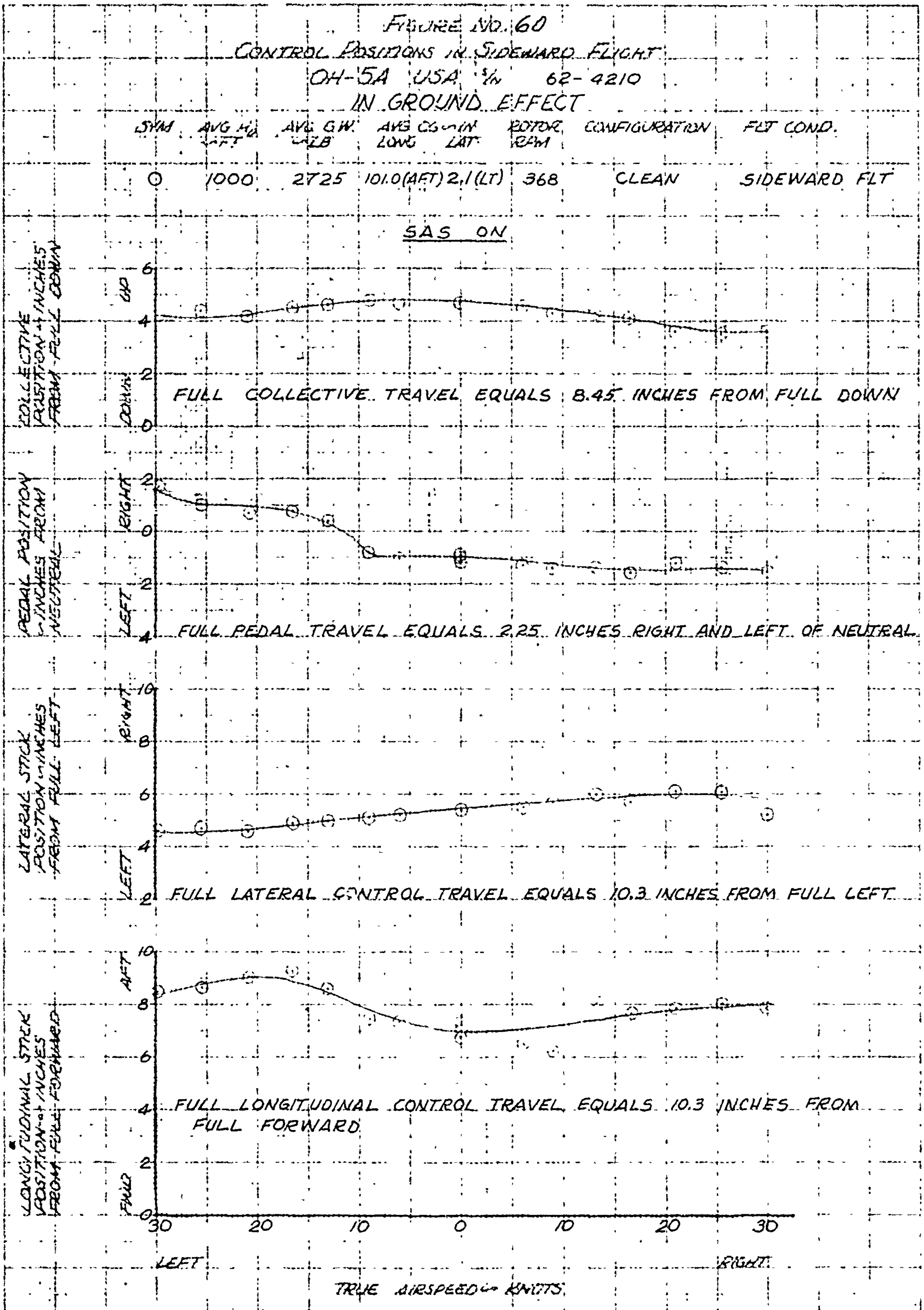


FIGURE NO. 60
CONTROL POSITIONS IN SIDEWARD FLIGHT
OH-5A USA S/N 62-4210
IN GROUND EFFECT
SYM AVG H_D ~FT
AVG G.W. ~LB
AVG CG ~ IN LONG LAT
ROTOR RPM
CONFIGURATION
FLT COND.
○ 1000 2725 101.0(AFT) 2.1(LT) 368 CLEAN SIDEWARD FLT
SAS ON
COLLECTIVE POSITION ~ INCHES FROM FULL DOWN
UP
DOWN
FULL COLLECTIVE TRAVEL EQUALS 8.45 INCHES FROM FULL DOWN
PEDAL POSITION ~ INCHES FROM NEUTRAL
RIGHT
LEFT
FULL PEDAL TRAVEL EQUALS 2.25 INCHES RIGHT AND LEFT OF NEUTRAL
LATERAL STICK POSITION ~ INCHES FROM FULL LEFT
RIGHT
LEFT
FULL LATERAL CONTROL TRAVEL EQUALS 10.3 INCHES FROM FULL LEFT
LONGITUDINAL STICK POSITION ~ INCHES FROM FULL FORWARD
AFT
FWD
FULL LONGITUDINAL CONTROL TRAVEL EQUALS 10.3 INCHES FROM FULL FORWARD
30 20 10 0 10 20 30
LEFT
RIGHT
TRUE AIRSPEED ~ KNOTS

FIGURE NO. 61

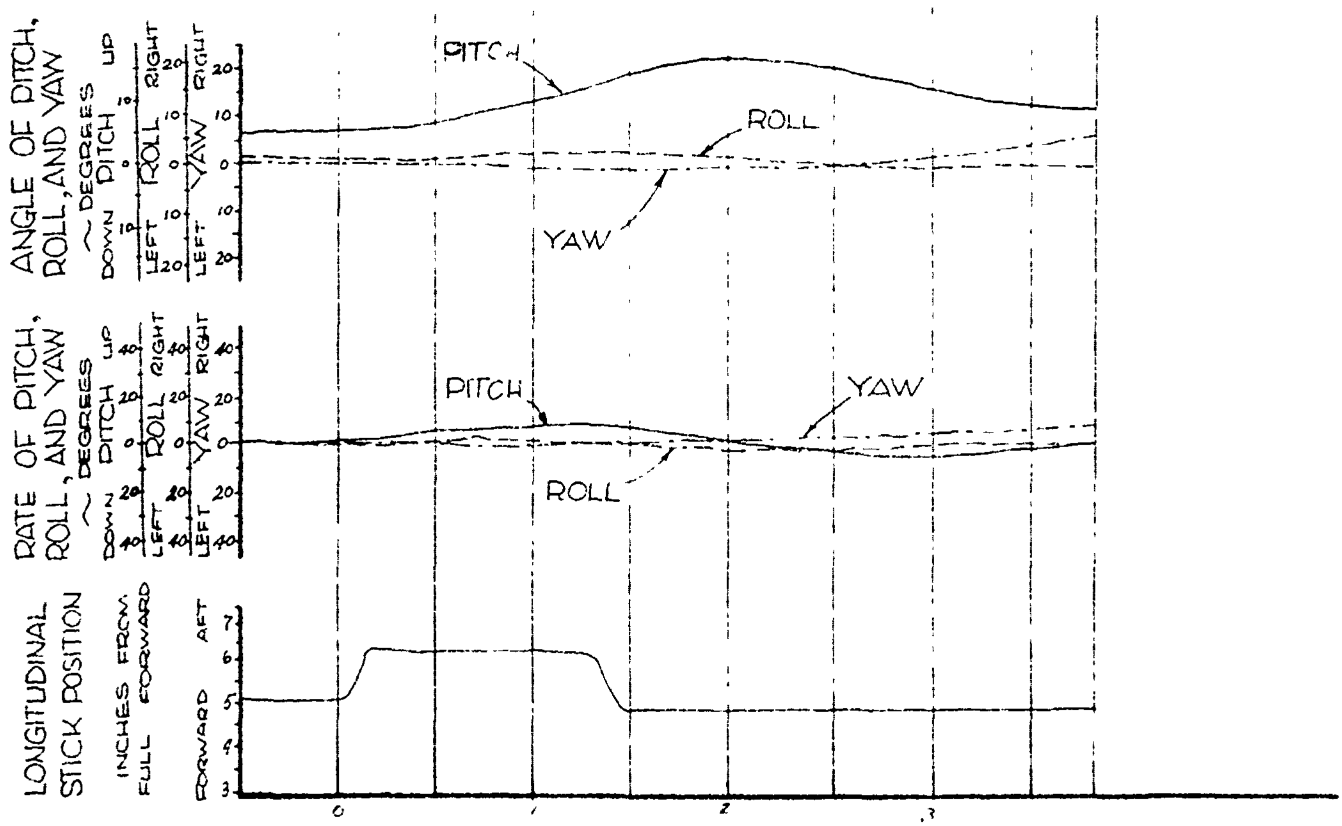
AFT LONGITUDINAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION : CLEAN
FULL LONGITUDINAL TRAVEL : 10.3 INCHES
AVERAGE GROSS WEIGHT : 2720 LBS.
LONG. C.G. LOCATION : 101.3 INCHES (AFT)
LATERAL C.G. LOCATION : 0.2 IN. (LT.)

FLIGHT CONDITION : HOVER (IGE)
TRIM CAS : ZERO
DENSITY ALTITUDE : 1800 FEET
ROTOR SPEED : 368 RPM
SAS CONDITION : ON

PITCH ———
ROLL - - - -
YAW —·—·—



TIME SECONDS

FIGURE NO.62

AFT LONGITUDINAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION : CLEAN
FULL LONGITUDINAL TRAVEL : 10.3 INCHES
AVERAGE GROSS WEIGHT : 2730 LBS.
LONG. C.G. LOCATION : 101.4 INCHES (AFT)
LATERAL C.G. LOCATION : 0.2 IN. (LT.)

FLIGHT CONDITION : LEVEL FLIGHT
TRIM CAS : 35 KNOTS
DENSITY ALTITUDE : 5300 FEET
ROTOR SPEED : 368 RPM
SAS CONDITION : ON

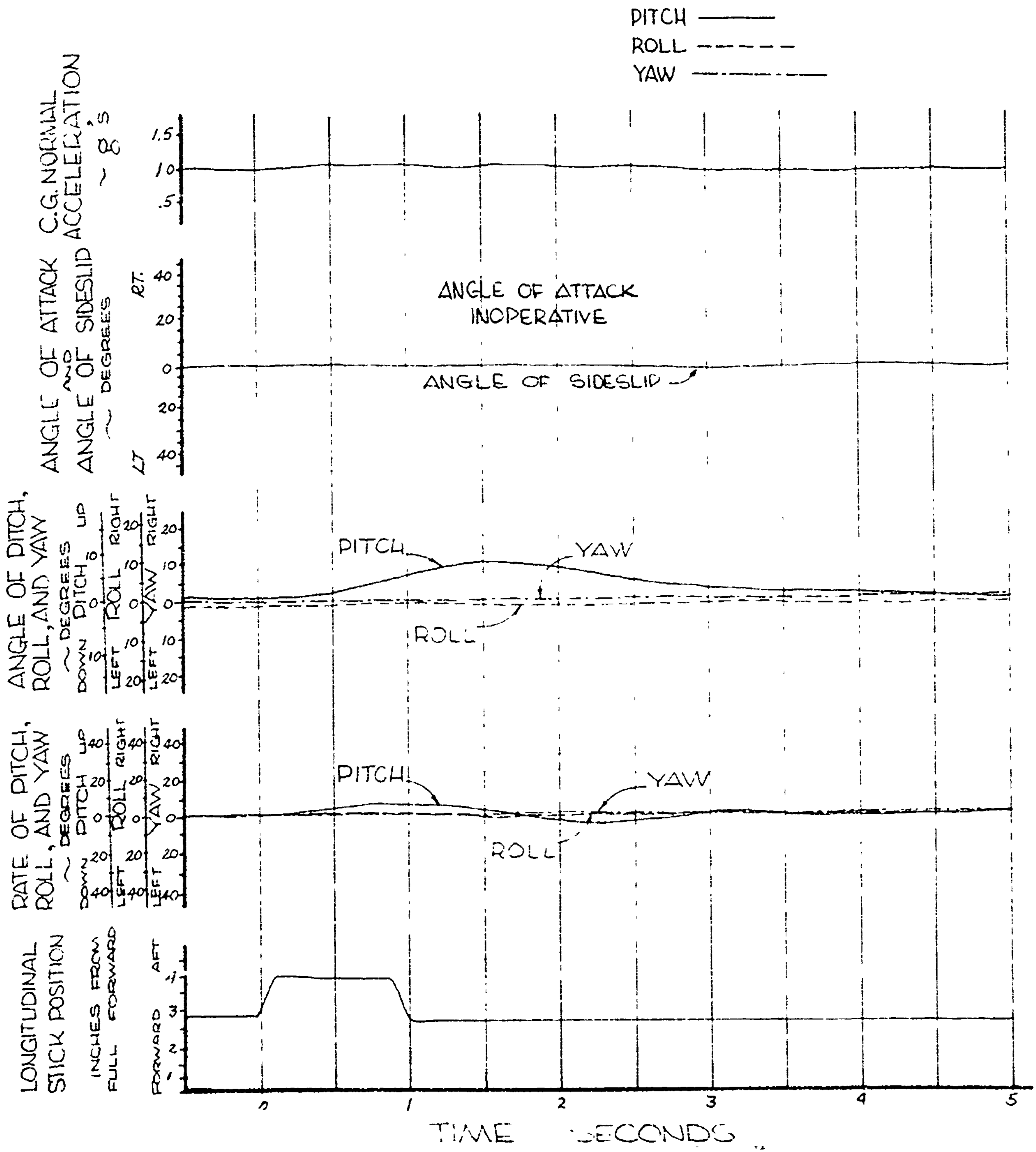
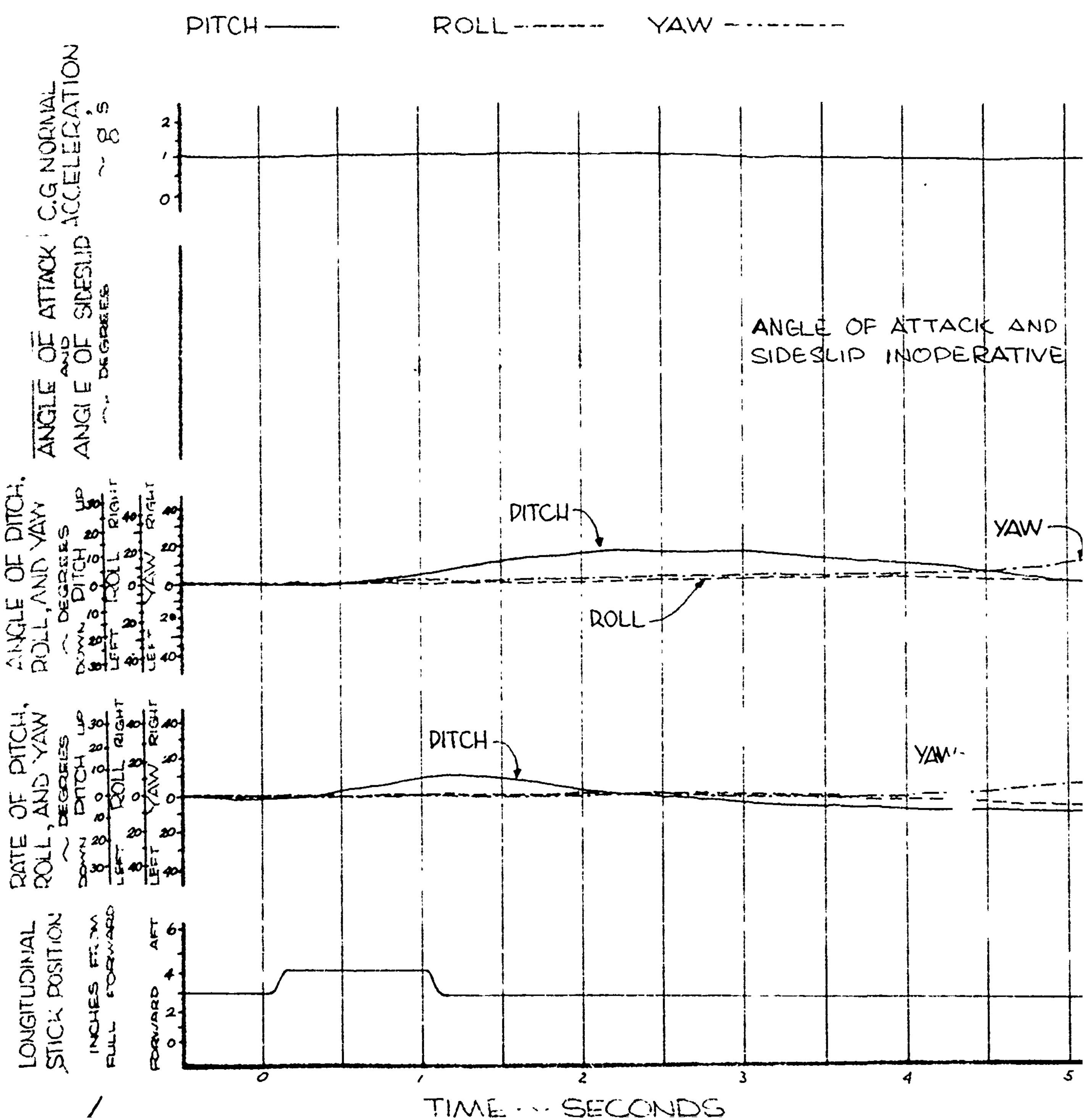


FIGURE NO. 63

AFT LONGITUDINAL PULSE

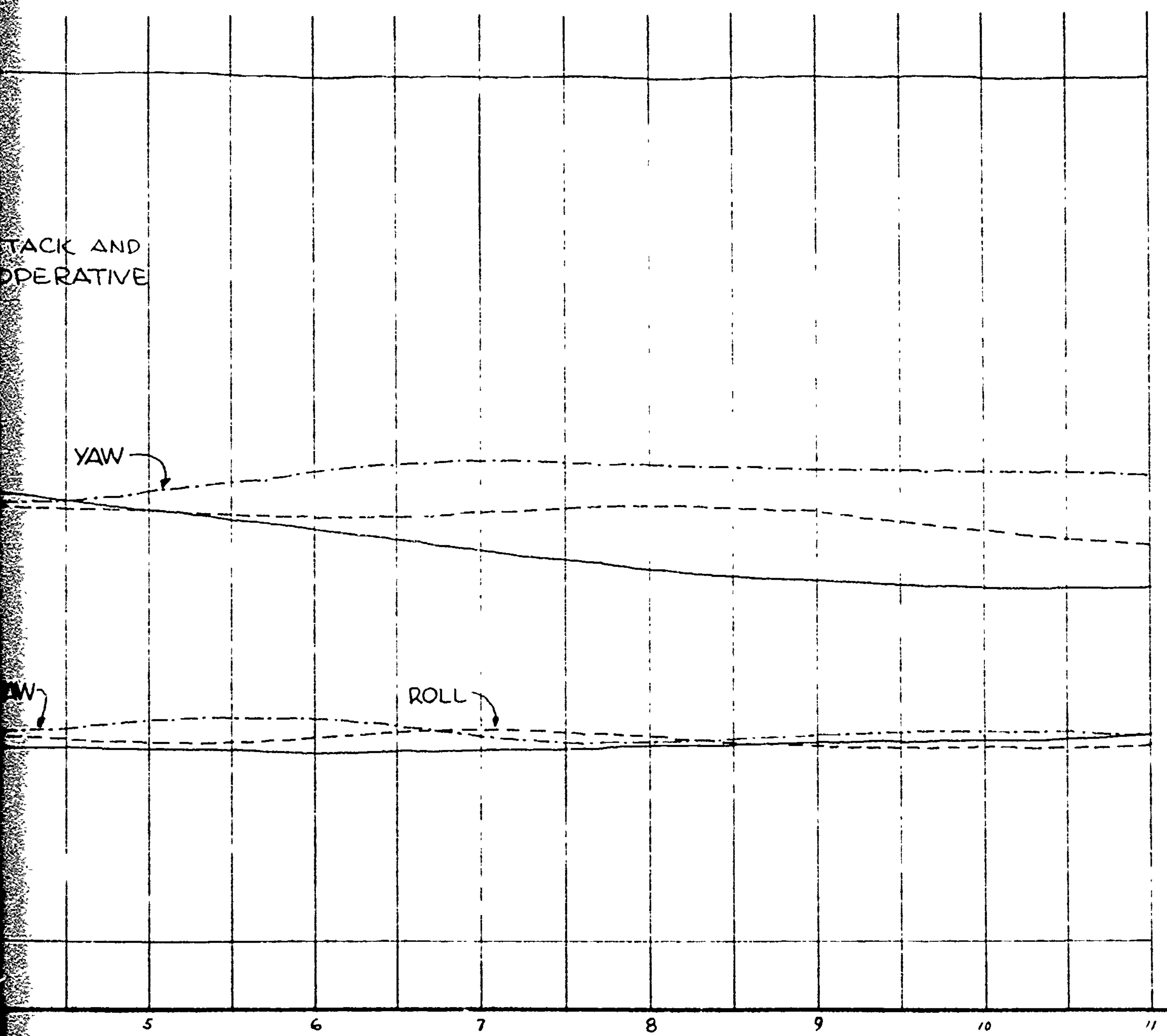
OH-5A, U.S.A., S/N 62-4209

CONFIGURATION : CLEAN FLIGHT CONDITION : LEVEL FLIGHT
FULL LONGITUDINAL TRAVEL : 10.3 INCHES TRIM CAS : 35 KNOTS
AVERAGE GROSS WEIGHT : 2650 LBS. DENSITY ALTITUDE : 7100 FEET
LONG. C.G. LOCATION : 101.4 INCHES (AFT) ROTOR SPEED : 368 RPM
LATERAL C.G LOCATION : 0.2 IN (LT.) SAS CONDITION : OFF



ELIGHT

EET



2

FIGURE NO. 64

AFT LONGITUDINAL PULSE

OH-5A, U.S.A., S/N 62-4209

CONFIGURATION : CLEAN FLIGHT CONDITION : LEVEL FLIGHT

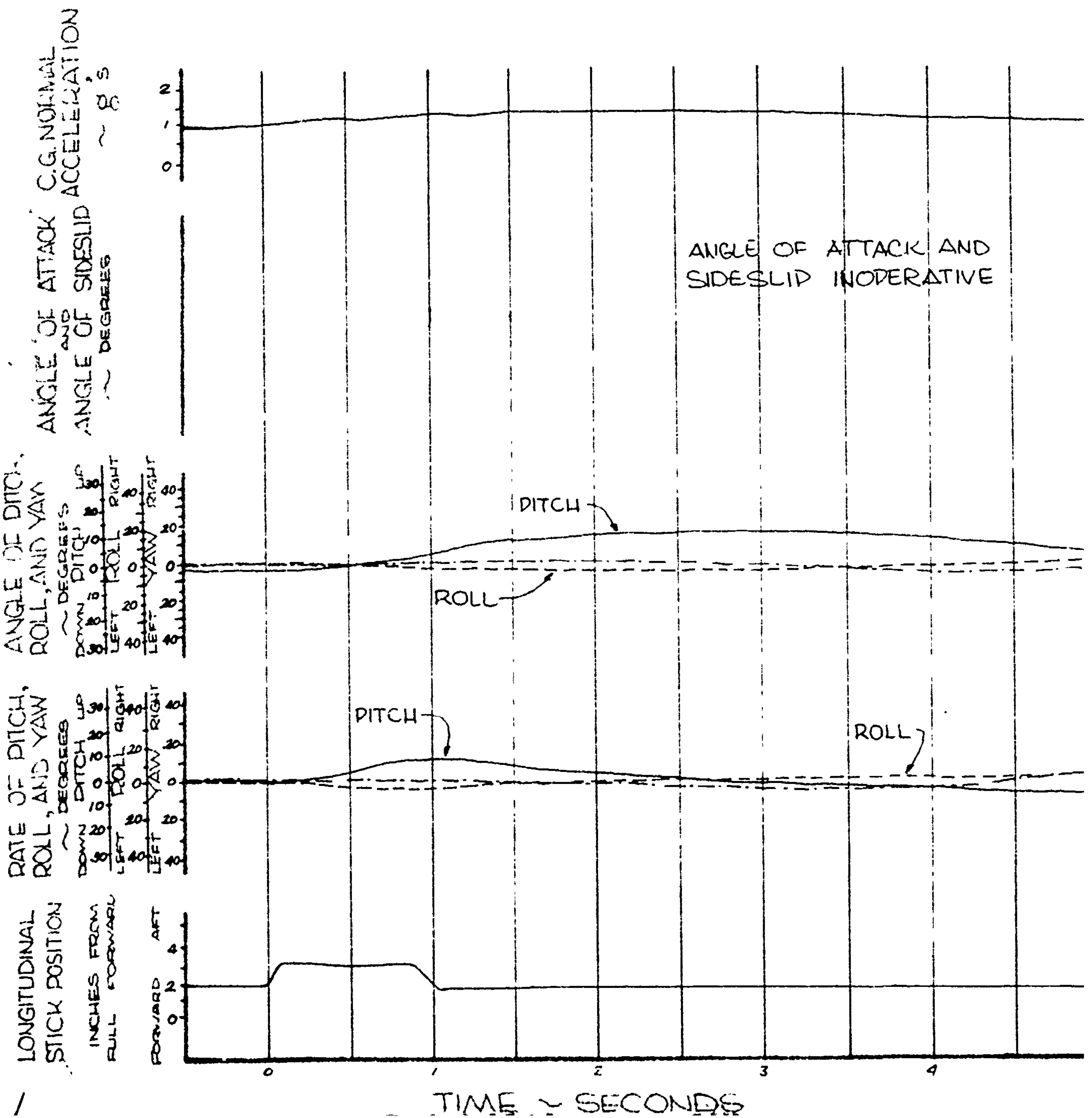
FULL LONGITUDINAL TRAVEL : 10.3 INCHES TRIM CAS : 78 KNOTS

AVERAGE GROSS WEIGHT : 2710 LBS. DENSITY ALTITUDE : 5800 FEET

LONG. C.G. LOCATION : 101.4 INCHES (AFT) ROTOR SPEED : 368 RPM

LATERAL C.G LOCATION : 0.2 IN. (LT.) SAS CONDITION : OFF

PITCH ——— ROLL - - - - - YAW — - — - —



RE NO. 64

JGITUDINAL PULSE

.S.A., S/N 62-4209

FLIGHT CONDITION : LEVEL FLIGHT

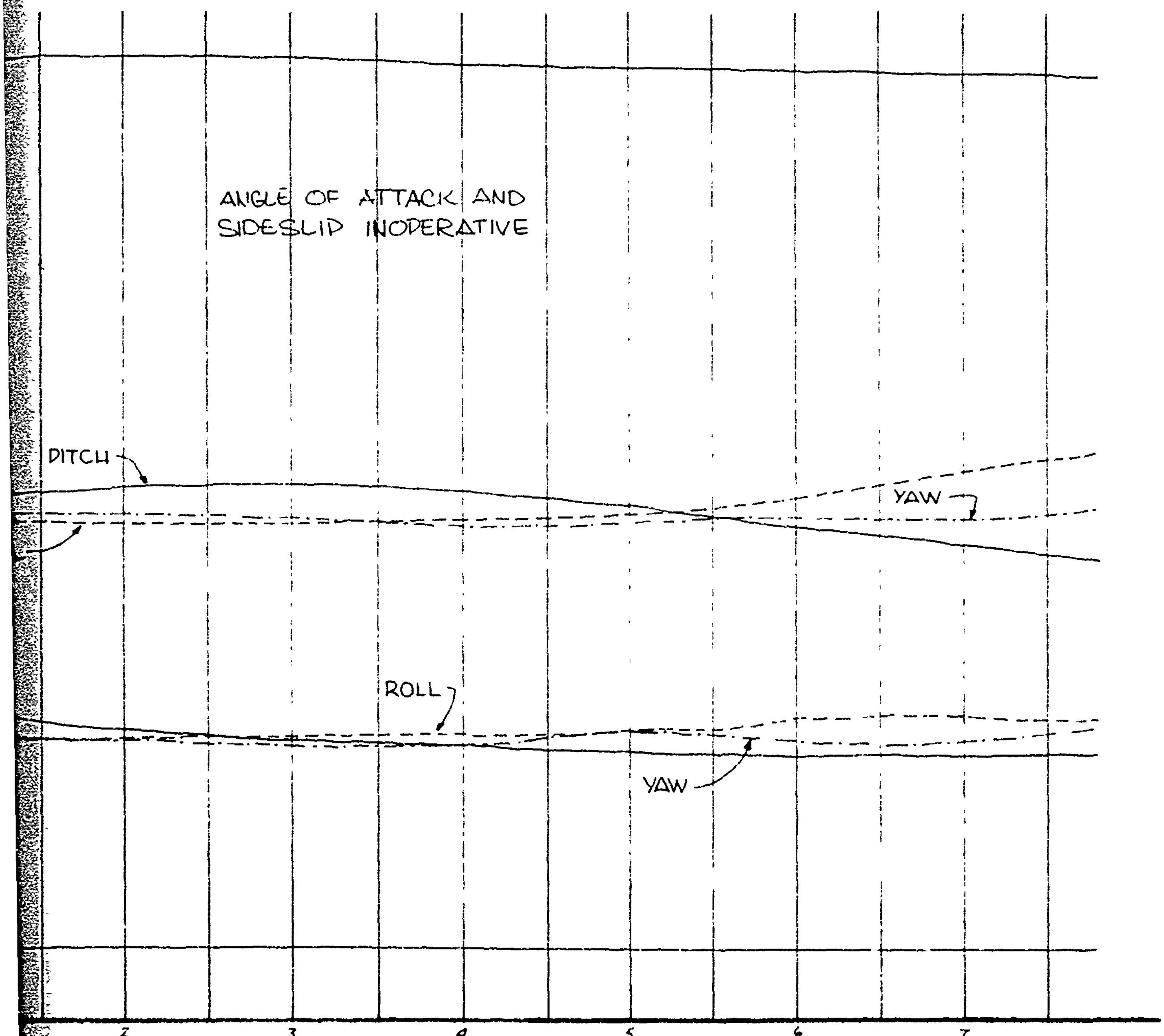
: 10.3 INCHES TRIM CAS : 78 KNOTS

2710 LBS. DENSITY ALTITUDE : 5800 FEET

4 INCHES (AFT) ROTOR SPEED : 368 RPM

2 IN. (LT.) SAS CONDITION : OFF

OLL ------ YAW -·-·-·-·-



~ SECONDS

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2

FIGURE NO. 65

FORWARD LONGITUDINAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION : CLEAN
FULL LONGITUDINAL TRAVEL: 10.3 INCHES
AVERAGE GROSS WEIGHT : 2690 LBS.
LONG. C.G. LOCATION : 101.4 INCHES (AFT)
LATERAL C.G. LOCATION : 0.2 IN. (LT.)

FLIGHT CONDITION : LEVEL FLIGHT
TRIM CAS : 91.5 KNOTS
DENSITY ALTITUDE : 5400 FEET
ROTOR SPEED : 368 RPM
SAS CONDITION : ON

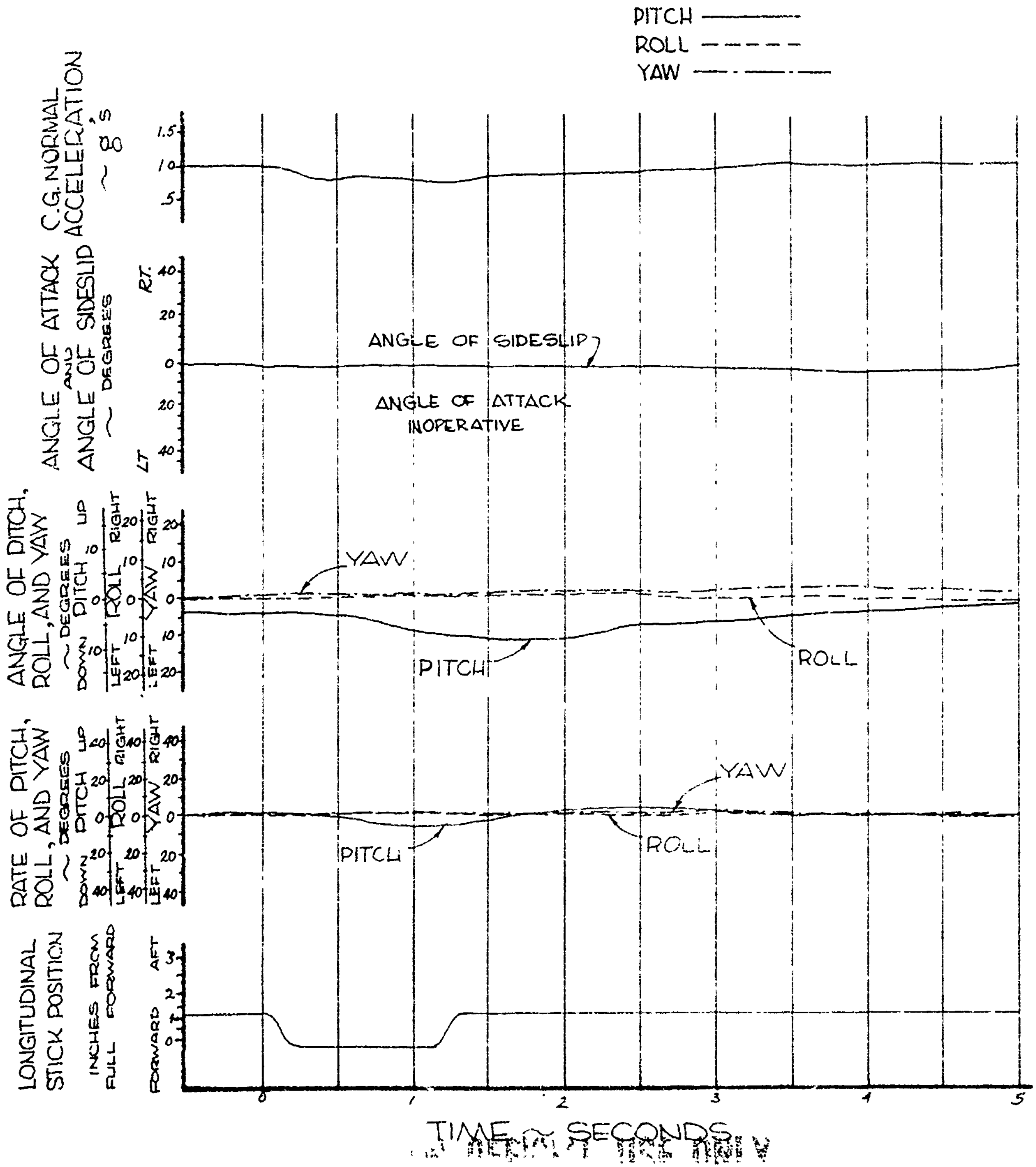

FIGURE NO. 66

AFT LONGITUDINAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION : CLEAN

FULL LONGITUDINAL TRAVEL : 10.3 INCHES

AVERAGE GROSS WEIGHT : 2750 LBS.

LONG C.G. LOCATION : 101.4 INCHES (AFT)

LATERAL C.G. LOCATION : 0.2 IN. (LT.)

FLIGHT CONDITION : CLIMB (MAX CONT P

TRIM CAS : 48.5 KNOTS

DENSITY ALTITUDE : 5000 FEET

ROTOR SPEED : 368 RPM

SAS CONDITION : ON

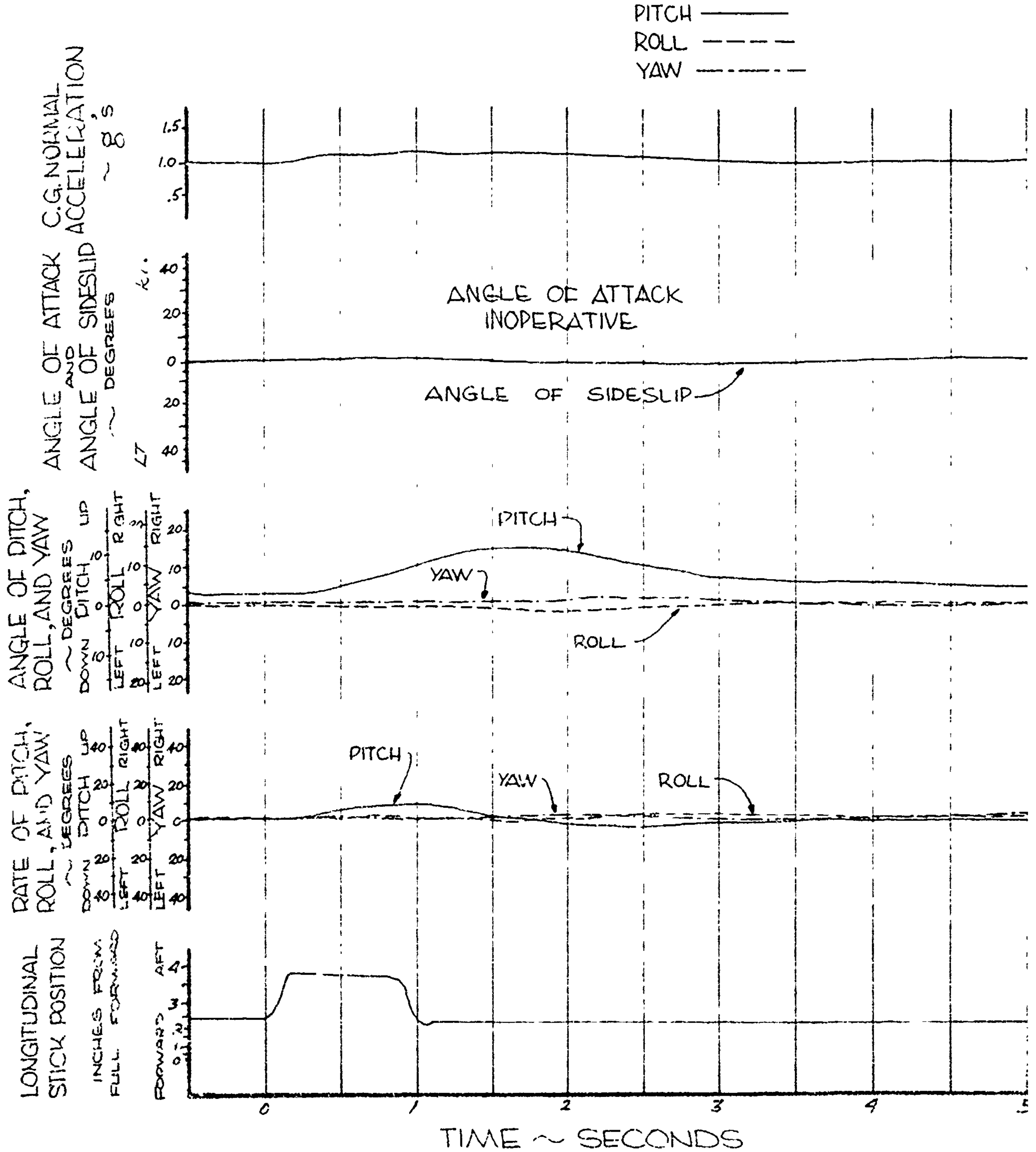

FIGURE NO.67

AFT LONGITUDINAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION: CLEAN	FLIGHT CONDITION: AUTOROTATION
FULL LONGITUDINAL TRAVEL: 10.3 INCHES	TRIM CAS: 55.5 KNOTS
AVERAGE GROSS WEIGHT: 2730 LBS.	DENSITY ALTITUDE 5000 FEET
LONG. C.G LOCATION: 101.4 INCHES(AFT)	ROTOR SPEED: 368 RPM
LATERAL C.G. LOCATION: 0.2 IN. (LT.)	SAS CONDITION: ON

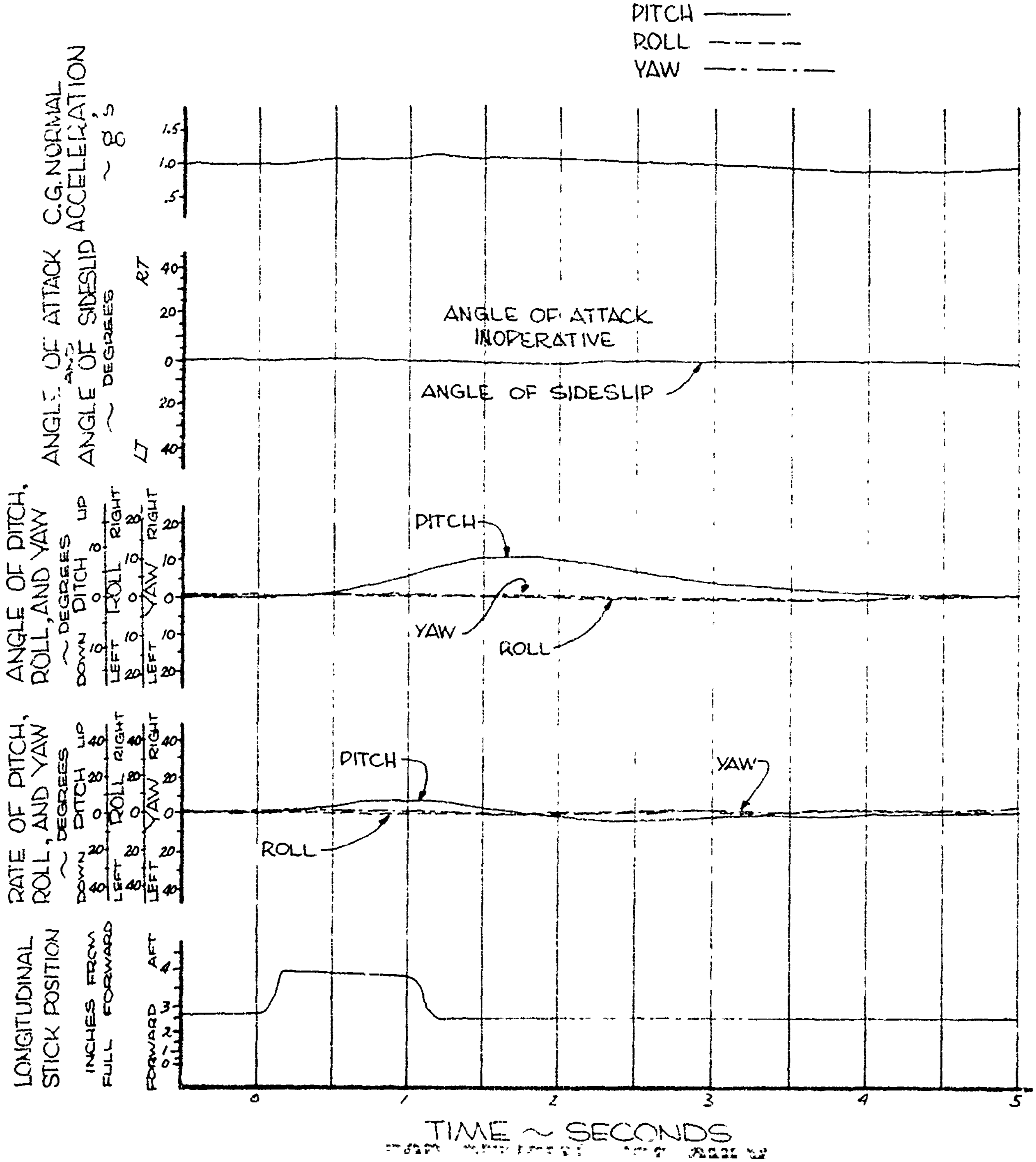

FIGURE NO. 68

FORWARD LONGITUDINAL PULSE

OH-5A, U.S.A., S/N 62-4209

CONFIGURATION : CLEAN
FLIGHT CONDITION : HOVER (IGE)
FULL LONGITUDINAL TRAVEL : 10.3 INCHES
TRIM CAS : ZERO
AVERAGE GROSS WEIGHT : 2750 LBS.
DENSITY ALTITUDE : 1500 FEET
LONG. C.G. LOCATION : 95.6 INCHES (FWD)
ROTOR SPEED : 368 RPM
LATERAL C.G. LOCATION : 0.2 IN. (LT.)
SAS CONDITION : ON

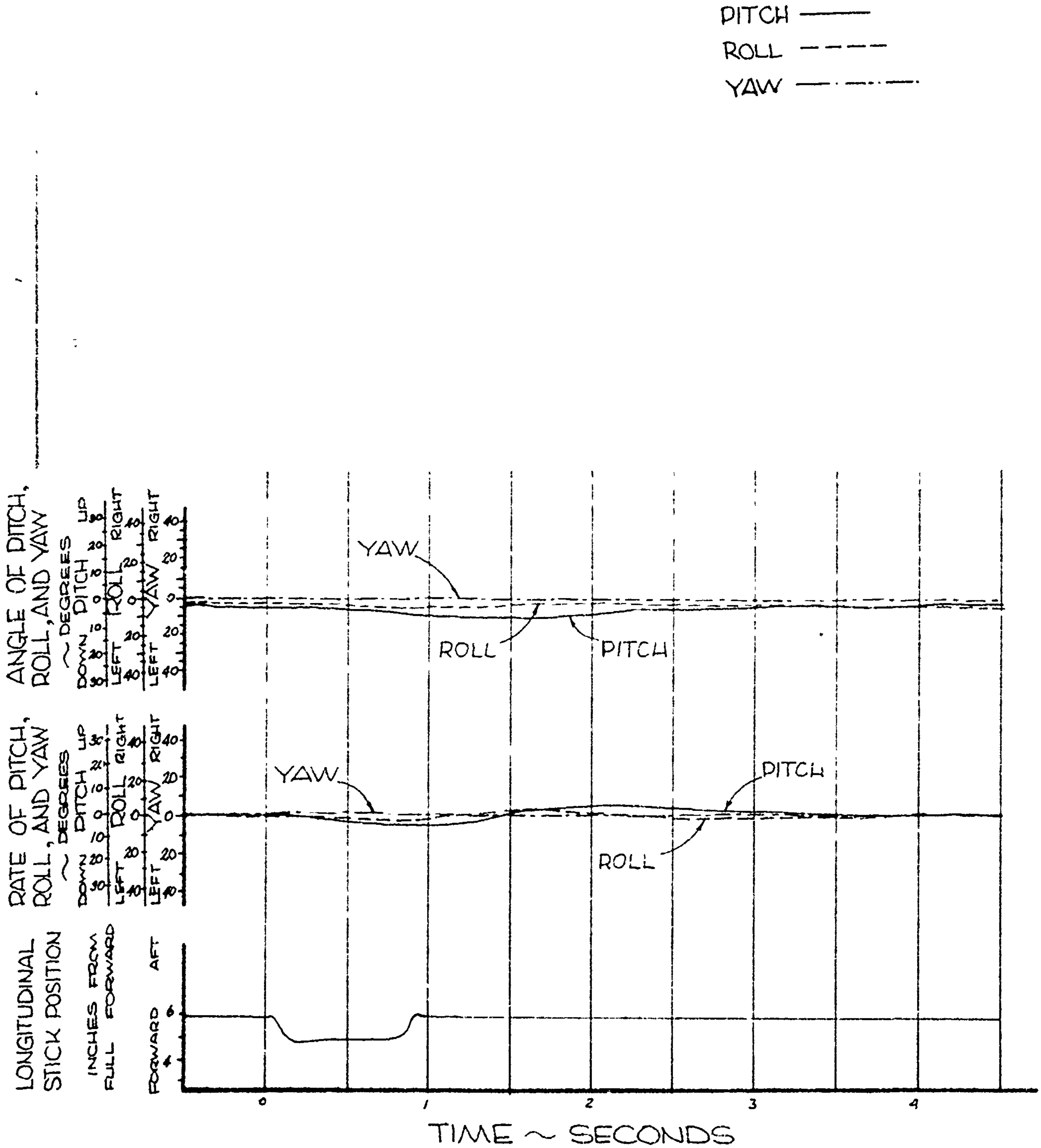

FIGURE NO. 69

AFT LONGITUDINAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION: CLEAN
FULL LONGITUDINAL TRAVEL: 10.3 INCHES
AVERAGE GROSS WEIGHT: 2710 LBS
LONG C.G. LOCATION: 95.4 INCHES (FWD)
LATERAL C.G. LOCATION: 0.2 IN. (LT.)

FLIGHT CONDITION: LEVEL FLIGHT
TRIM CAS: 93 KNOTS
DENSITY ALTITUDE: 4900 FEET
ROTOR SPEED: 368 RPM
SAS CONDITION: ON

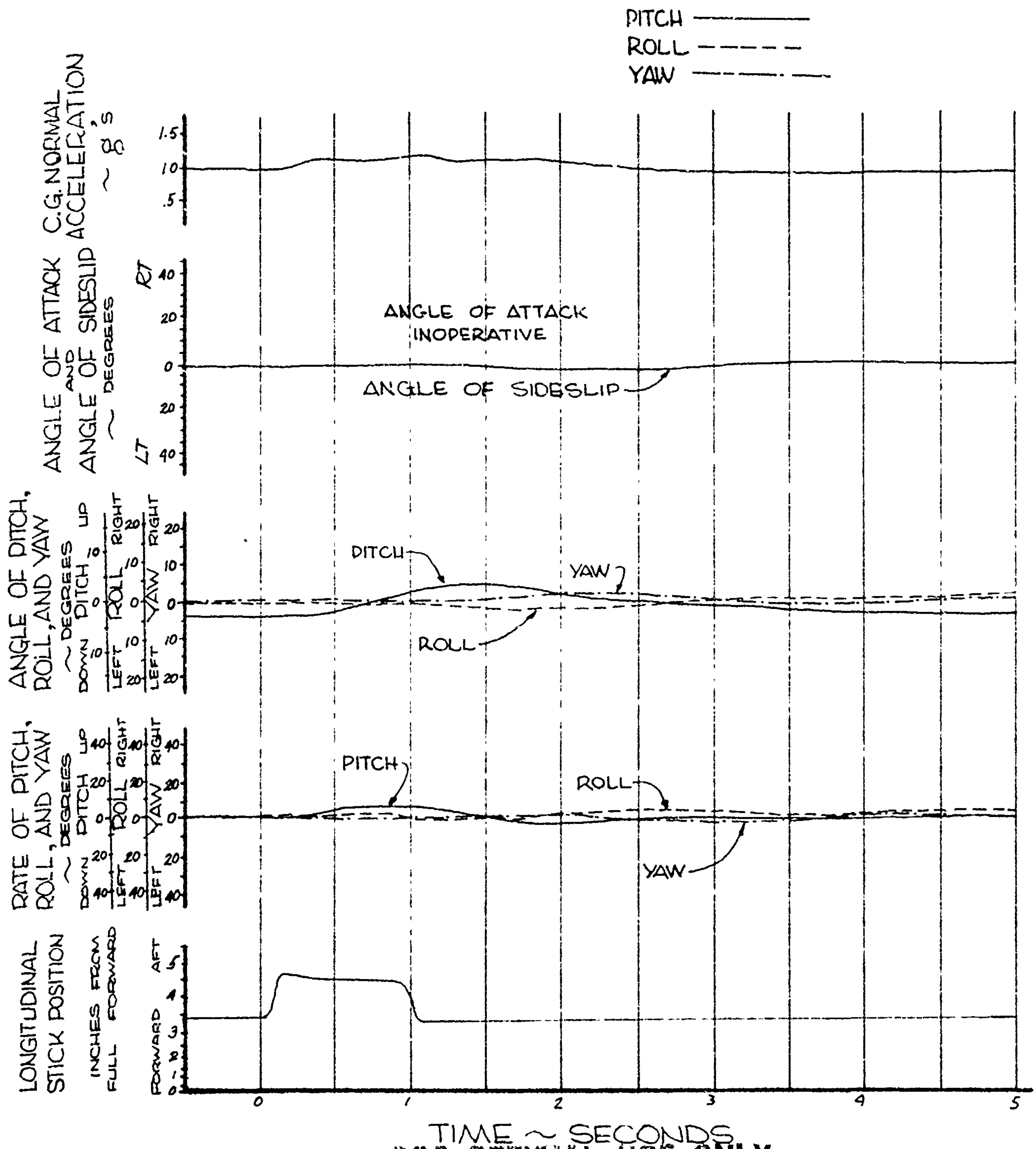

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FIGURE NO.70

AFT LONGITUDINAL PULSE

CH-5A, U.S.A., S/N 62-4209

CONFIGURATION : CLEAN
FLIGHT CONDITION : CLIMB (MAX CONT POWER)
FULL LONGITUDINAL TRAVEL : 10.3 INCHES
TRIM CAS : 48.5 KNOTS
AVERAGE GROSS WEIGHT : 2710 LBS.
DENSITY ALTITUDE : 5000 FEET
LONG. C.G. LOCATION : 95.6 INCHES (FWD)
ROTOR SPEED : 368 RPM
LATERAL C.G LOCATION : 0.2 IN. (LT.)
SAS CONDITION : OFF

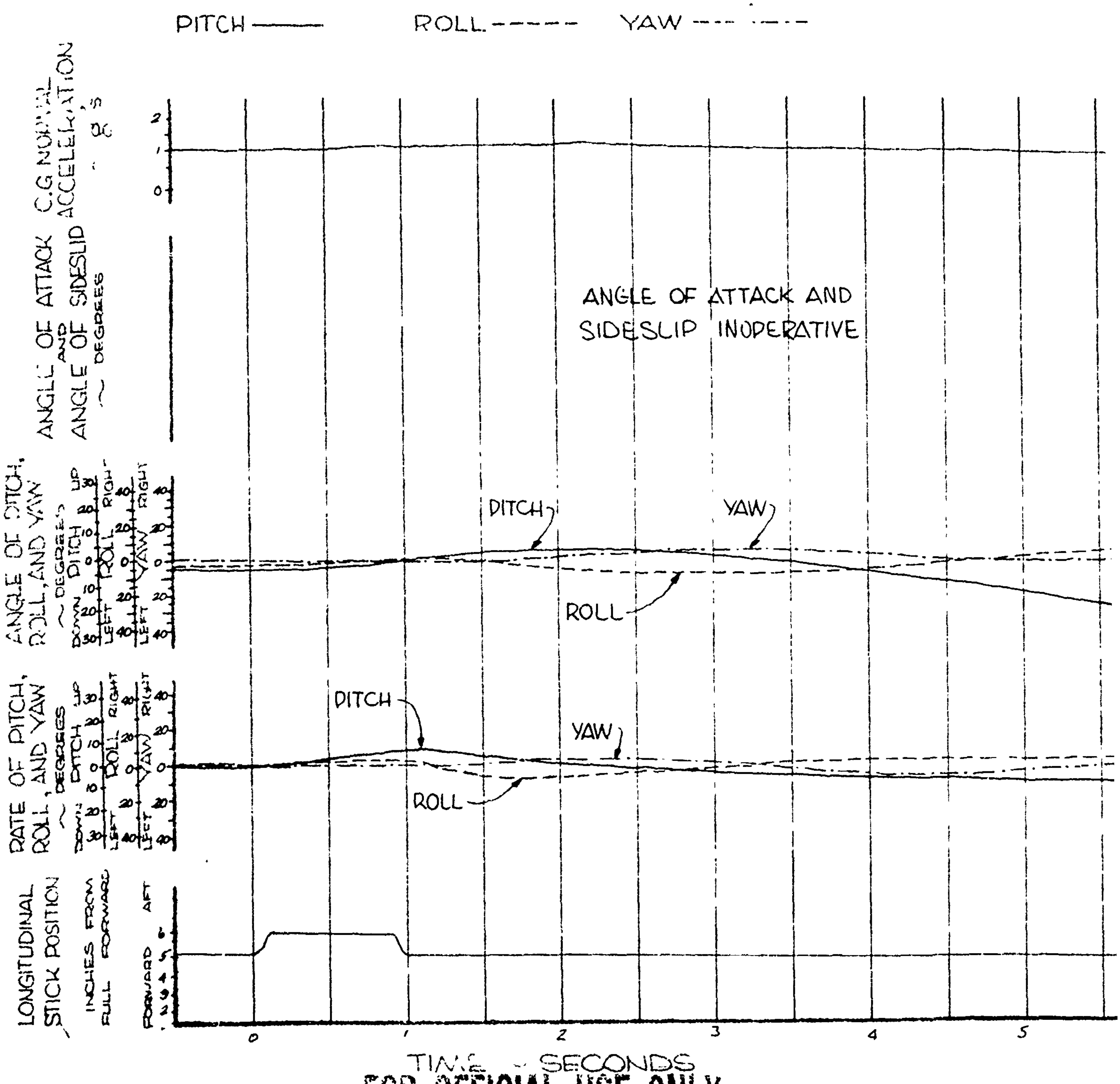


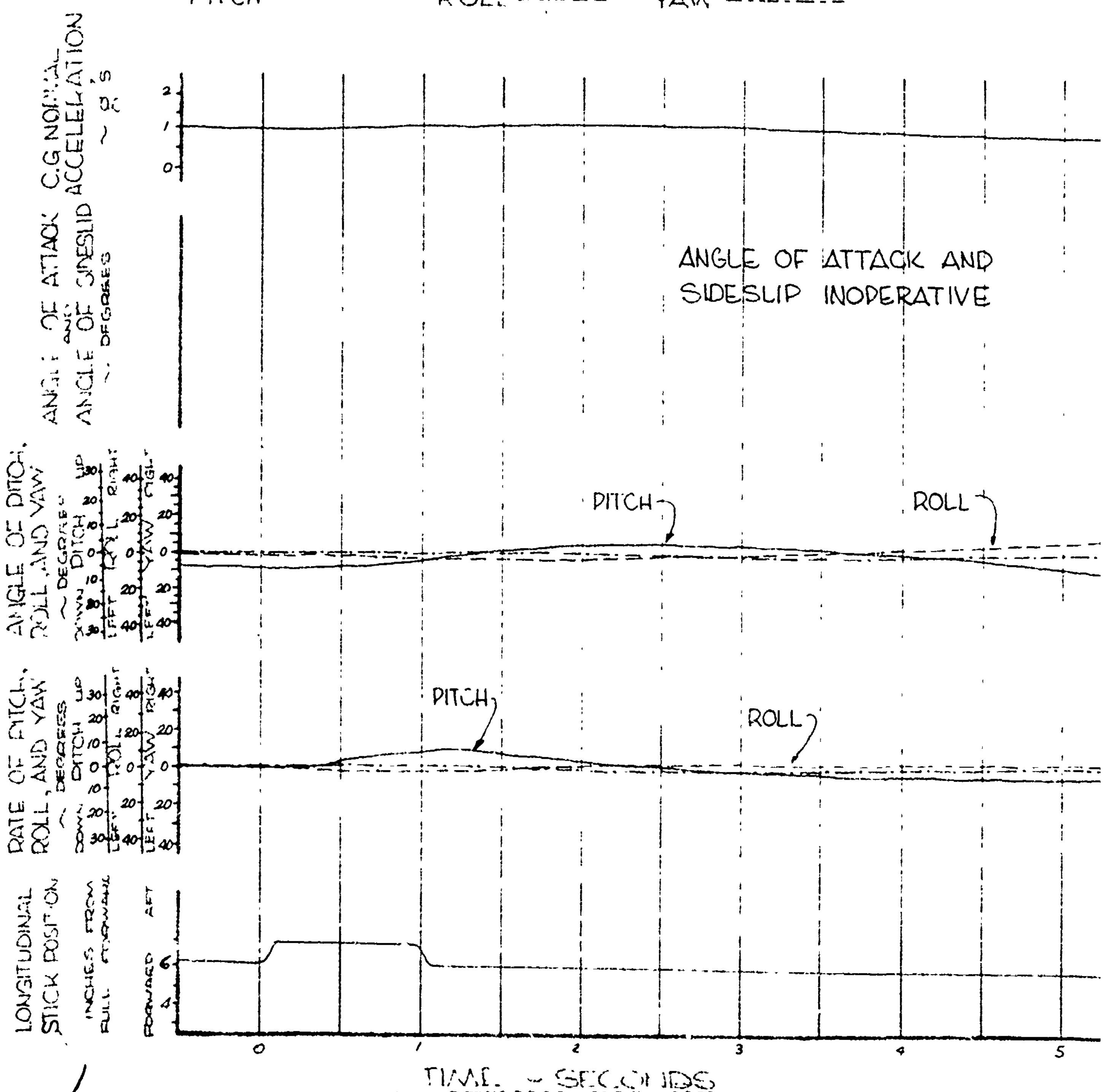
FIGURE NO. 71

AFT LONGITUDINAL PULSE

OH 5A, U.S.A., S/N 62-4209

CONFIGURATION : CLEAN FLIGHT CONDITION : AUTOROTATION
FULL LONGITUDINAL TRAVEL : 10.3 INCHES TRIM CAS : 55.5 KNOTS
AVERAGE GROSS WEIGHT : 2630 LBS. DENSITY ALTITUDE : 5000 FEET
LONG. C.G. LOCATION : 95.4 INCHES(FWD) ROTOR SPEED : 368 RPM
LATERAL C.G LOCATION : 0.2 IN.(LT.) SAS. CONDITION : OFF

PITCH ——— ROLL - - - - - YAW -·-·-·-·-



FOR OFFICIAL USE ONLY

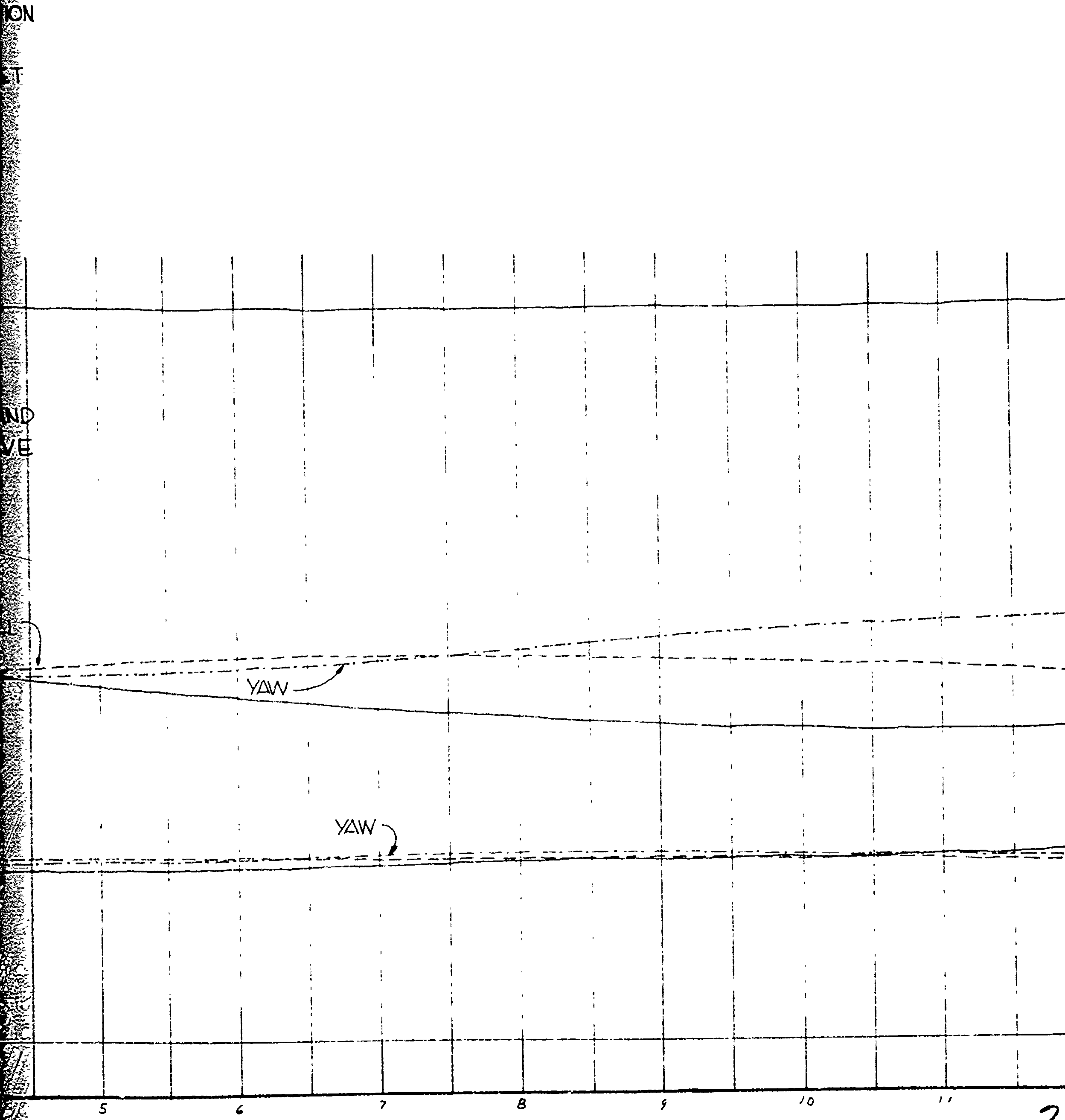


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FIGURE NO. 72
AFT LONGITUDINAL PULSE
OH-5A, U.S.A., S/N 62-4210

CONFIGURATION: CLEAN
FULL LONGITUDINAL TRAVEL: 10.3 INCHES
AVERAGE GROSS WEIGHT: 2950 LBS.
LONG. C.G. LOCATION: 95.5 INCHES (FWD)
LATERAL C.G. LOCATION: 0.2 IN. (LT.)

FLIGHT CONDITION: LEVEL FLIGHT
TRIM CAS: 83 KNOTS
DENSITY ALTITUDE: 5100 FEET
ROTOR SPEED: 368 RPM
SAS CONDITION: ON

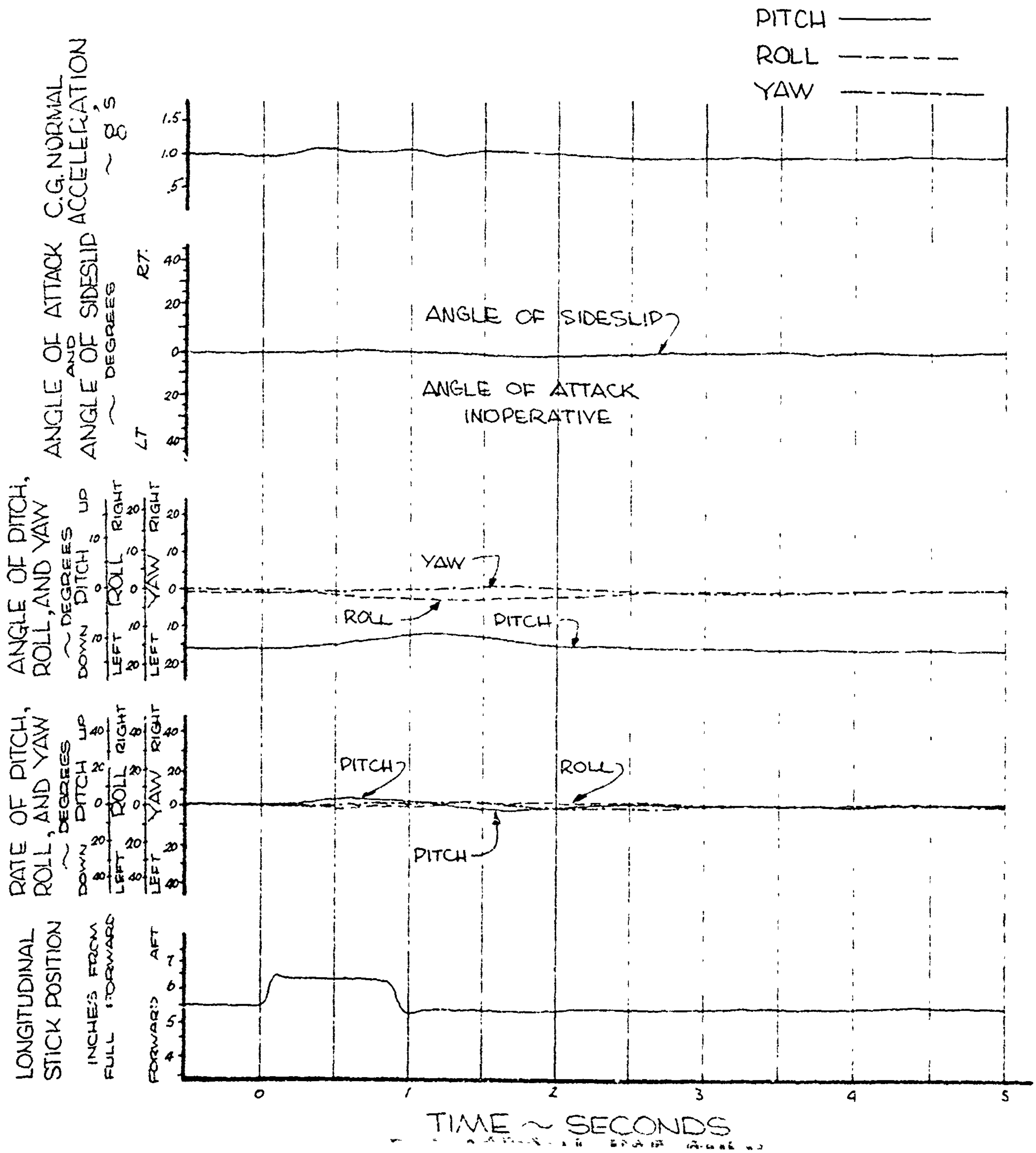


FIGURE NO. 73

AFT LONGITUDINAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION : CLEAN
FULL LONGITUDINAL TRAVEL : 10.3 INCHES
AVERAGE GROSS WEIGHT : 2680 LBS.
LONG C.G. LOCATION : 101.3 INCHES (AFT)
LATERAL C.G. LOCATION : 0.2 IN. (LT.)

FLIGHT CONDITION : LEVEL FLIGHT
TRIM CAS : 75 KNOTS
DENSITY ALTITUDE : 10200 FEET
ROTOR SPEED : 368 RPM
SAS CONDITION : ON

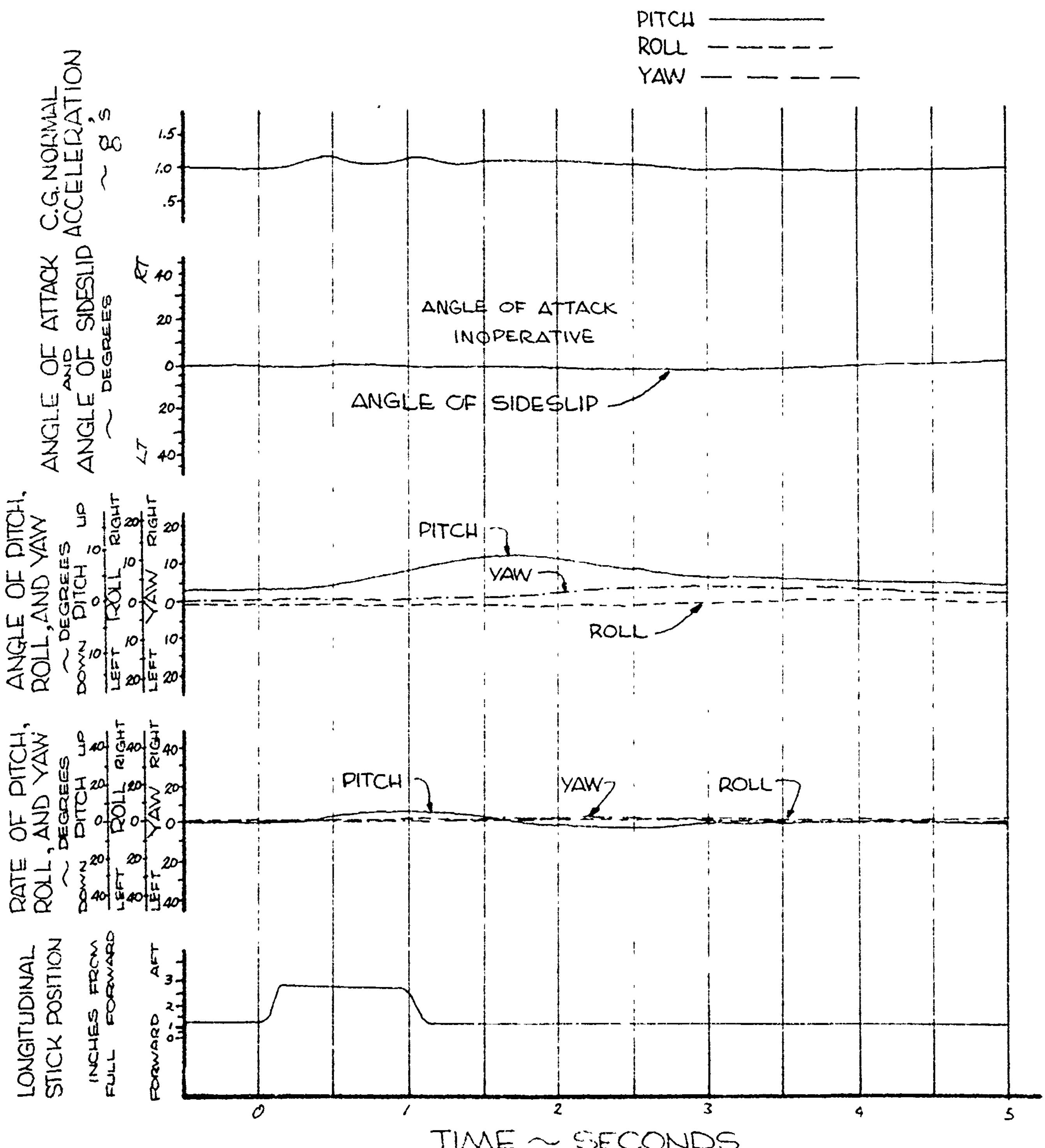


FIGURE NO. 74

AFT LONGITUDINAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION: XM-7
FULL LONGITUDINAL TRAVEL: 10.3 INCHES
AVERAGE GROSS WEIGHT: 2680 LBS
LONG. C.G. LOCATION: 101.2 INCHES (AFT)
LATERAL C.G. LOCATION: 1.1 IN. (LT.)

FLIGHT CONDITION: LEVEL FLIGHT
TRIM CAS: 77 KNOTS
DENSITY ALTITUDE: 4600 FEET
ROTOR SPEED: 368 RPM
SAS CONDITION: ON

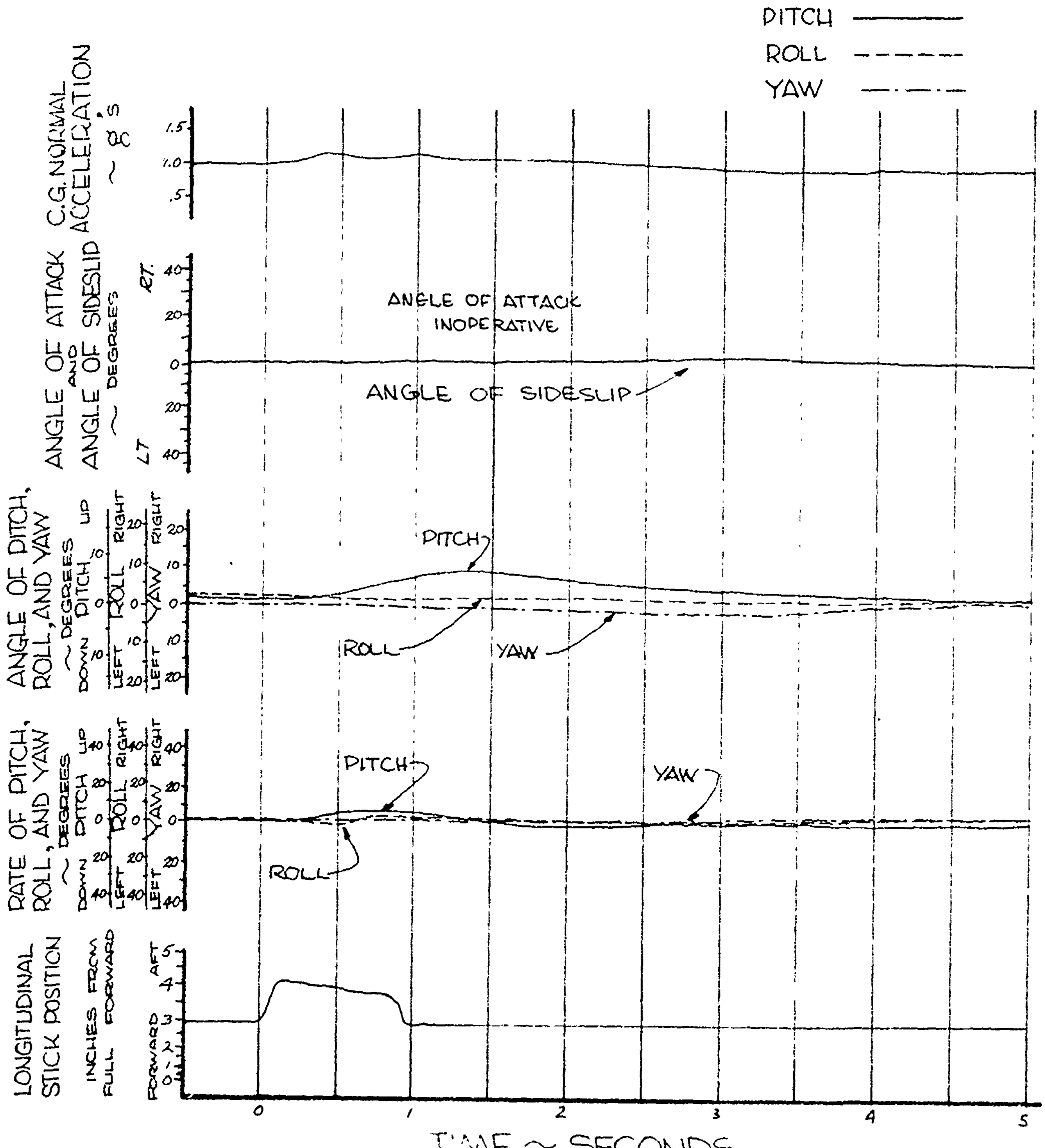


FIGURE NO. 75

AFT LONGITUDINAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION: XM-8
FULL LONGITUDINAL TRAVEL: 10.3 INCHES
AVERAGE GROSS WEIGHT: 2680 LBS.
LONG C.G. LOCATION: 101.2 INCHES (AFT)
LATERAL C.G. LOCATION: 0.3 IN. (RT.)

FLIGHT CONDITION: LEVEL FLIGHT
TRIM CAS: 77 KNOTS
DENSITY ALTITUDE: 4800 FEET
ROTOR SPEED: 368 RPM
SAS CONDITION: ON

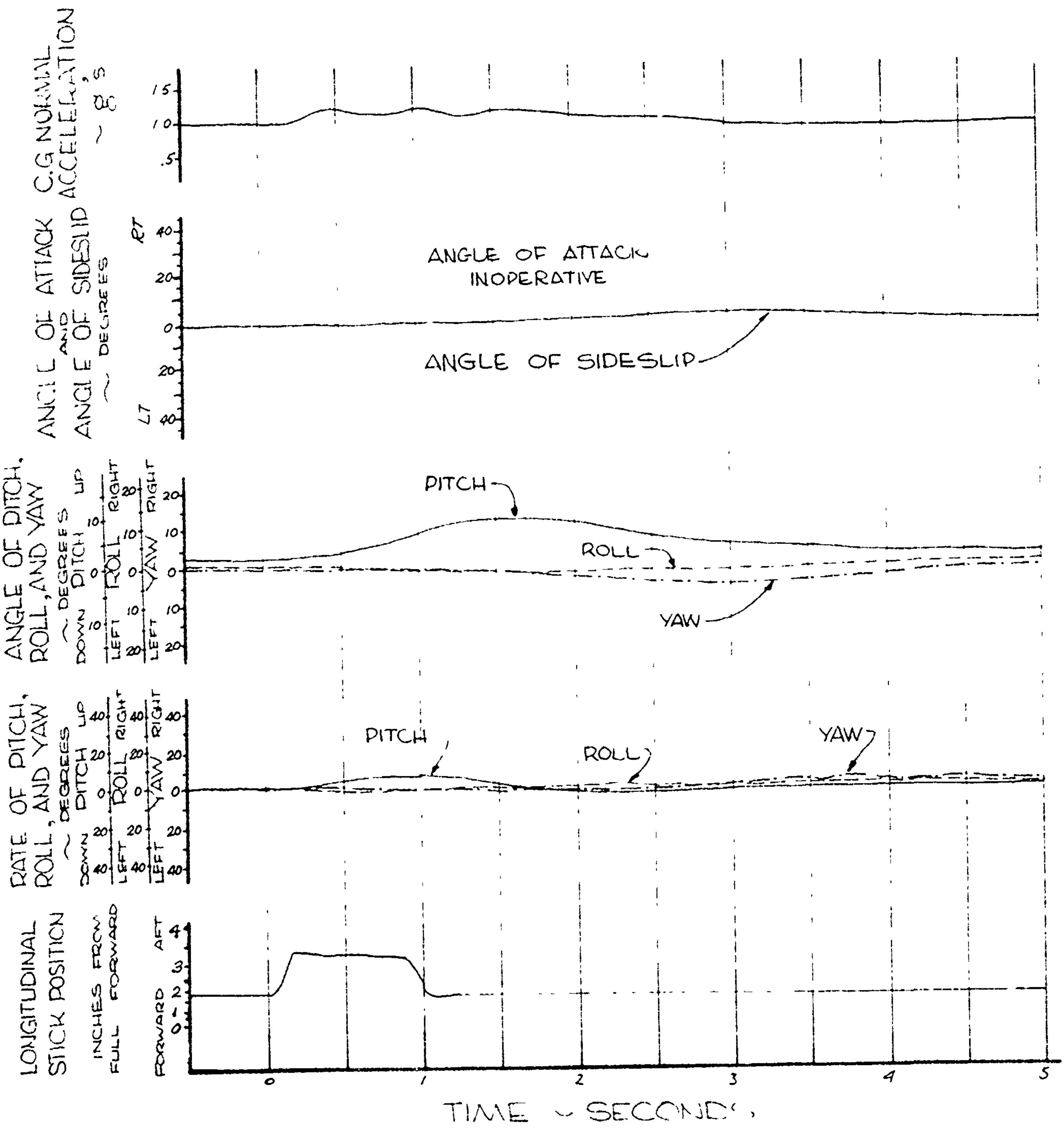


FIGURE NO. 76

RIGHT LATERAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION : CLEAN
FULL LATERAL TRAVEL : 10.3 INCHES
AVERAGE GROSS WEIGHT : 2700 LBS.
LONG. C.G. LOCATION : 101.3 INCHES (AFT)
LATERAL C.G. LOCATION : 0.2 IN. (LT.)

FLIGHT CONDITION : HOVER (IGE)
TRIM CAS : ZERO
DENSITY ALTITUDE : 1700 FEET
ROTOR SPEED : 368 RPM
SAS CONDITION : ON

PITCH ————
ROLL - - - - - -
YAW -·-·-·-

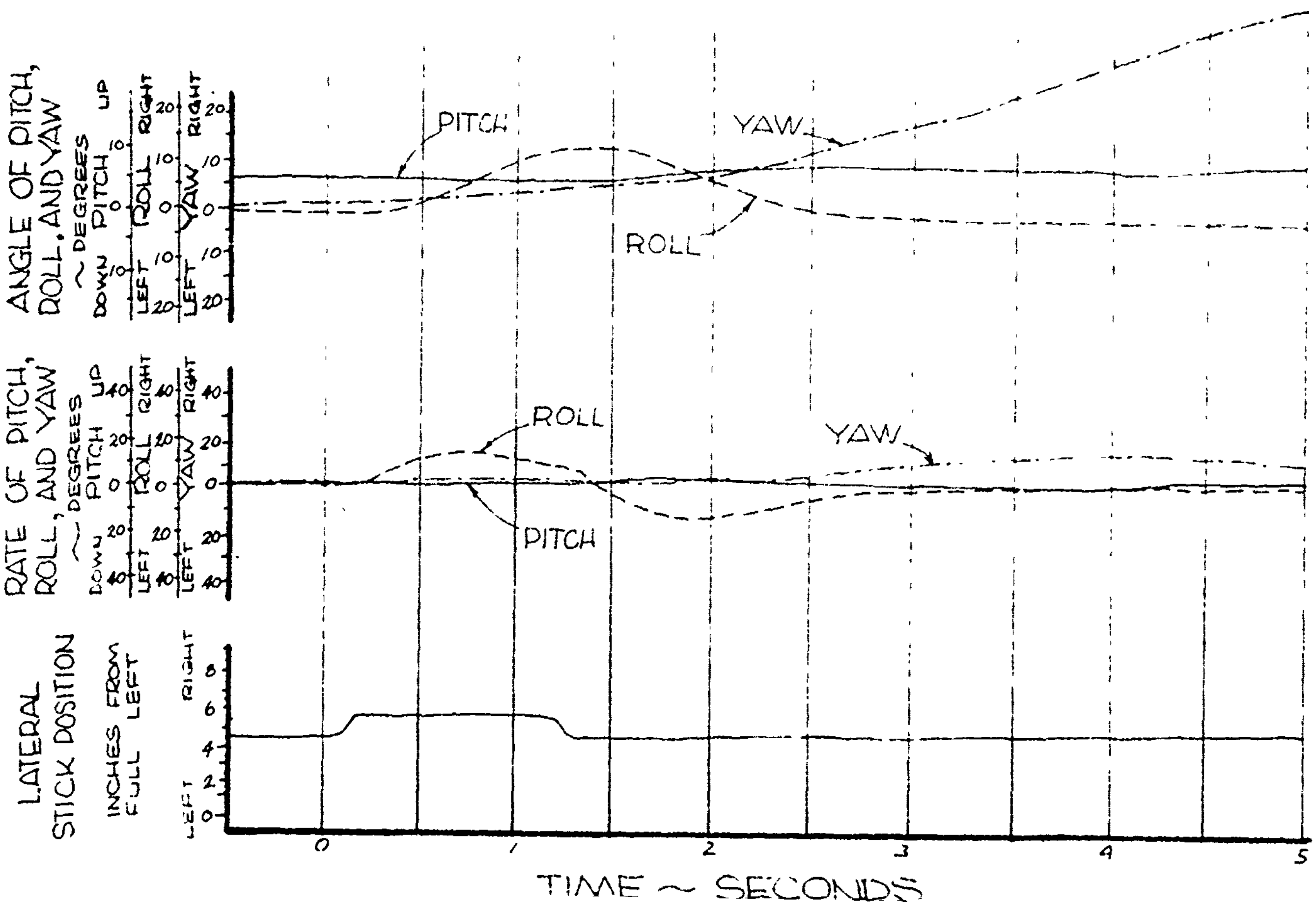


FIGURE NO. 77

RIGHT LATERAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION: CLEAN
FULL LATERAL TRAVEL: 10.3 INCHES
AVERAGE GROSS WEIGHT: 2700 LBS.
LONG. C.G. LOCATION: 101.3 INCHES (AFT)
LATERAL C.G. LOCATION: 0.2 IN. (LT.)

FLIGHT CONDITION: LEVEL FLIGHT
TRIM CAS: 35 KNOTS
DENSITY ALTITUDE: 4900 FEET
ROTOR SPEED: 368 RPM
SAS CONDITION: ON

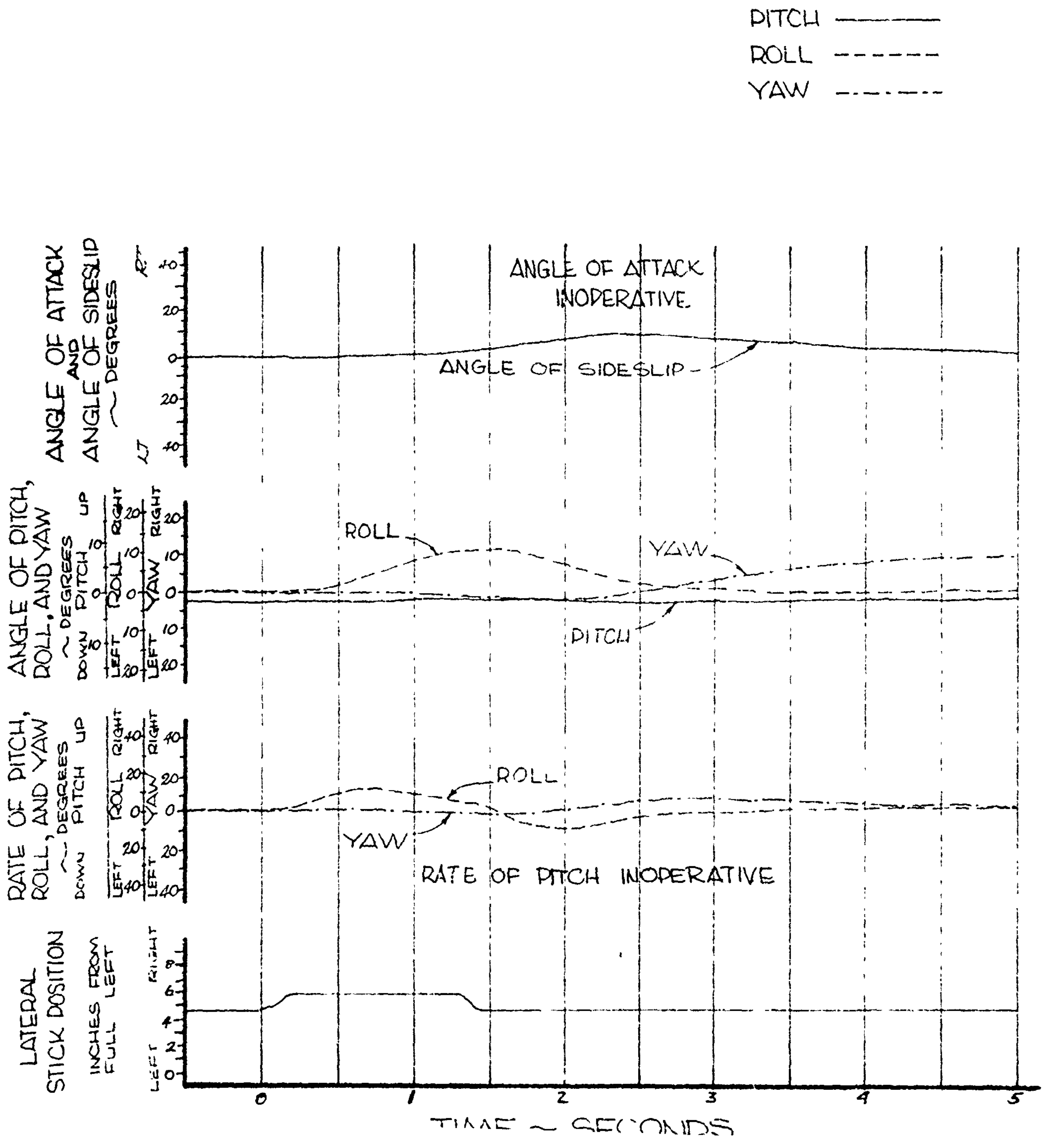
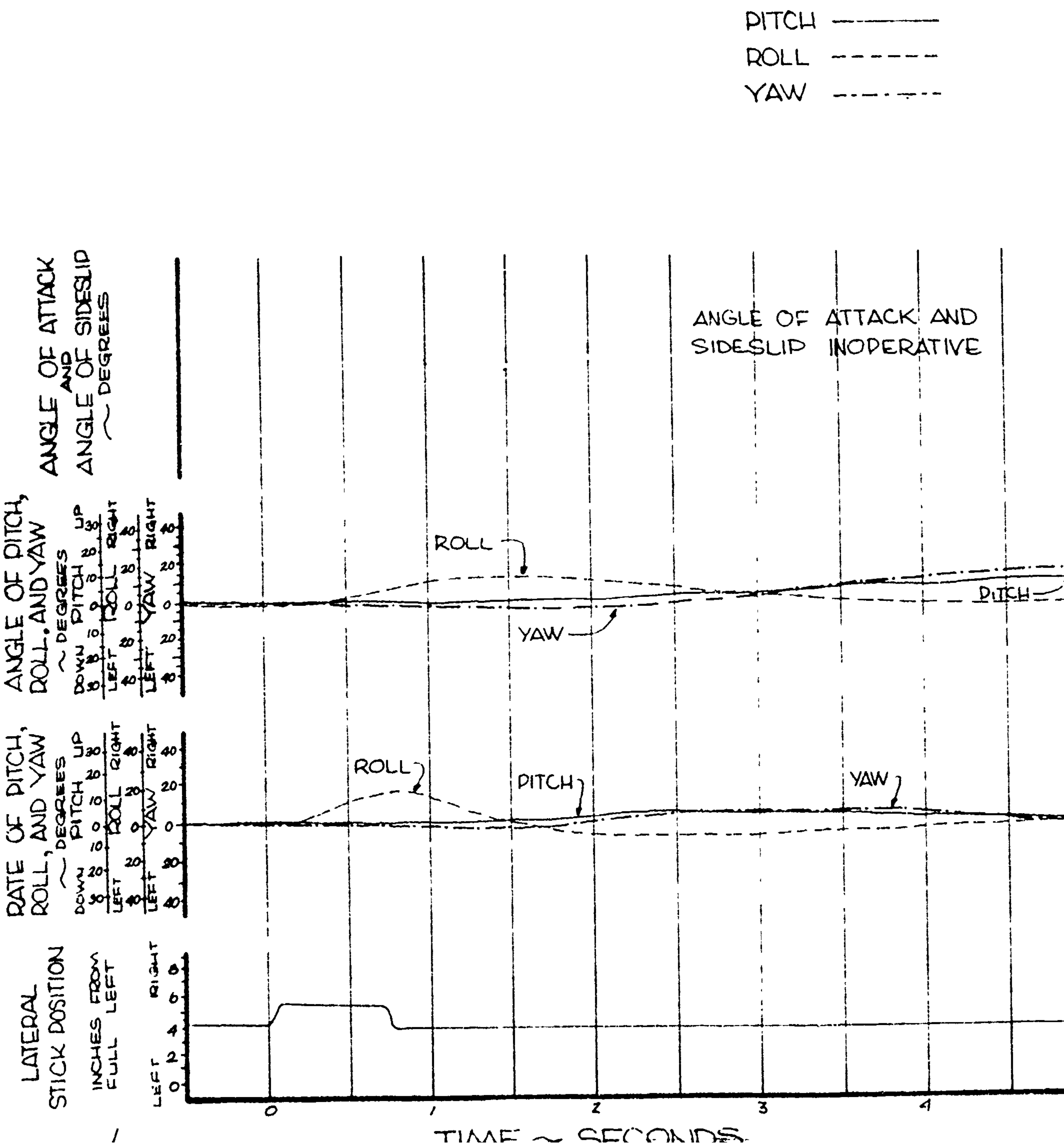


FIGURE NO. 78
RIGHT LATERAL PULSE
OH-5A, U.S.A., S/N 62-4209

CONFIGURATION : CLEAN
FULL LATERAL TRAVEL : 10.3 INCHES
AVERAGE GROSS WEIGHT : 2620 LBS.
LONG. C.G. LOCATION : 101.4 INCHES (AFT)
LATERAL C.G. LOCATION : 0.2 IN. (LT.)

FLIGHT CONDITION : LEVEL FLIGHT
TRIM CAS : 35 KNOTS
DENSITY ALTITUDE : 7100 FEET
ROTOR SPEED : 368 RPM
SAS CONDITION : OFF



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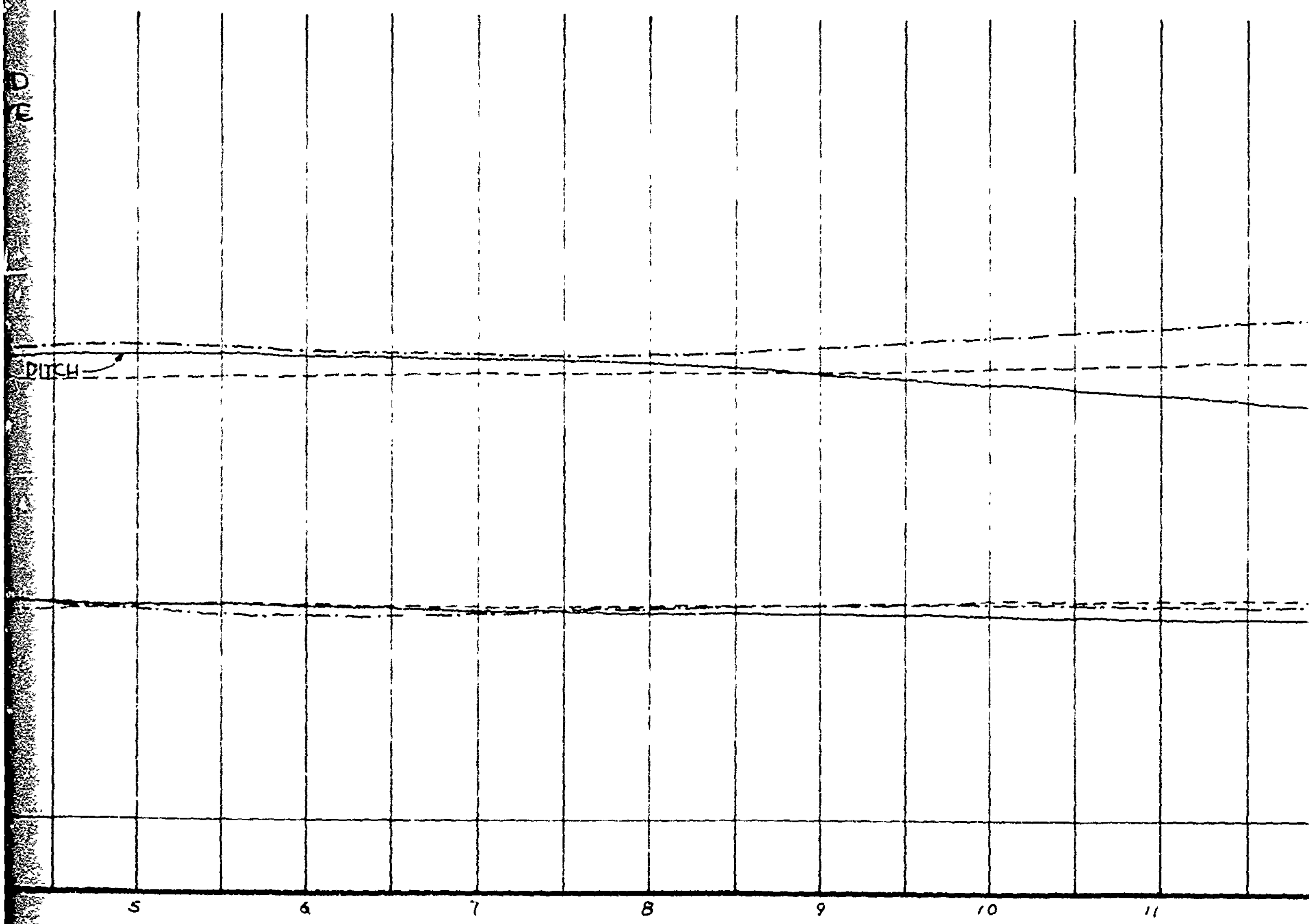


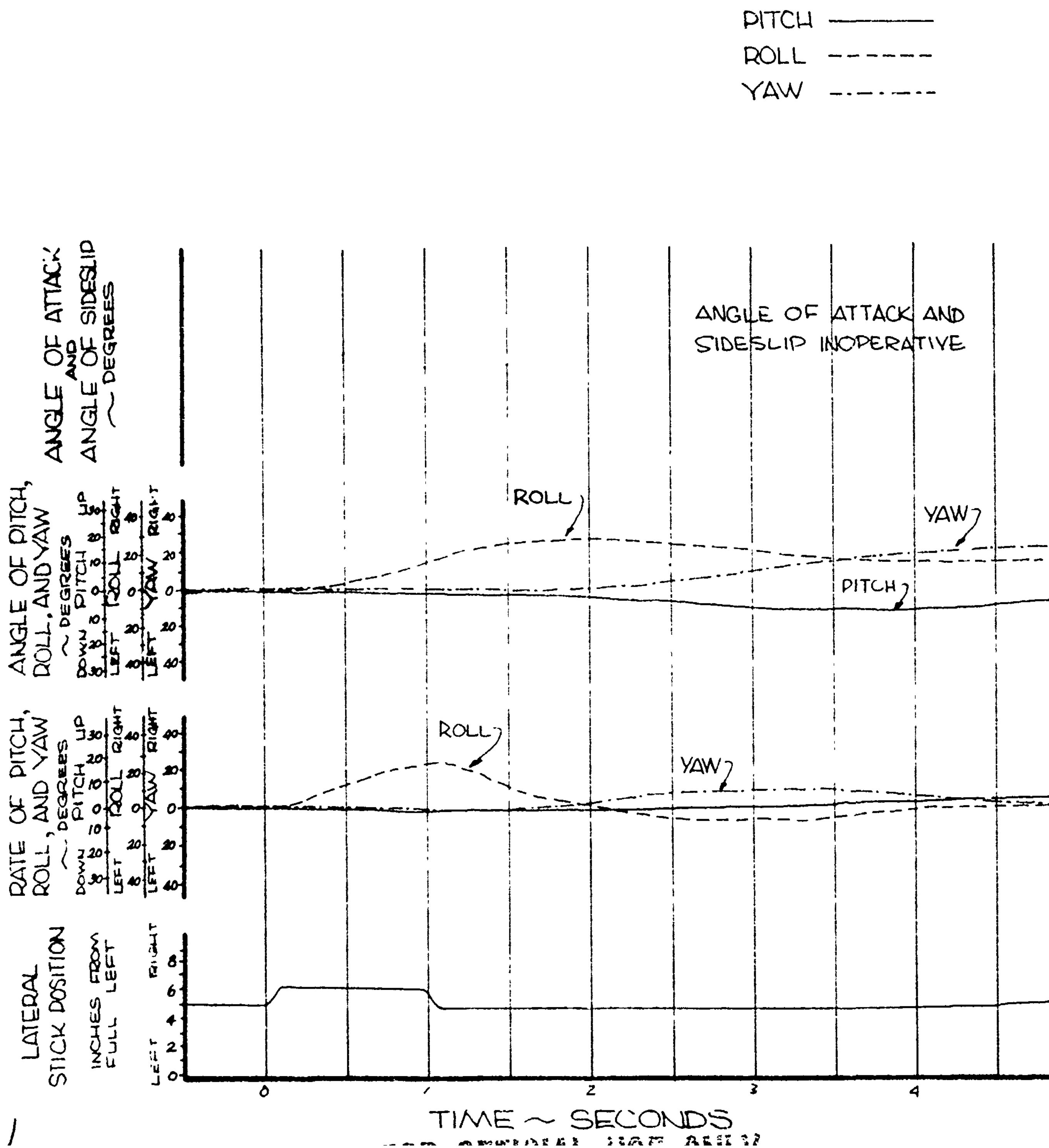
FIGURE NO. 79

RIGHT LATERAL PULSE

OH-5A, U.S.A., S/N 62-4209

CONFIGURATION : CLEAN
FULL LATERAL TRAVEL : 10.3 INCHES
AVERAGE GROSS WEIGHT : 2690 LBS
LONG. C.G. LOCATION : 101.4 INCHES (AFT)
LATERAL C.G. LOCATION : 0.2 IN. (LT.)

FLIGHT CONDITION : LEVEL FLIGHT
TRIM CAS : 78 KNOTS
DENSITY ALTITUDE : 5800 FEET
ROTOR SPEED : 368 RPM
SAS CONDITION : OFF



NO.79

RAL PULSE

A., S/N 62-4209

FLIGHT CONDITION : LEVEL FLIGHT

INCHES TRIM CAS : 78 KNOTS

90 LBS DENSITY ALTITUDE : 5800 FEET

CHES (AFT) ROTOR SPEED : 368 RPM

IN. (LT.) SAS CONDITION: OFF

PITCH ———

ROLL ------

YAW -·-·-·-

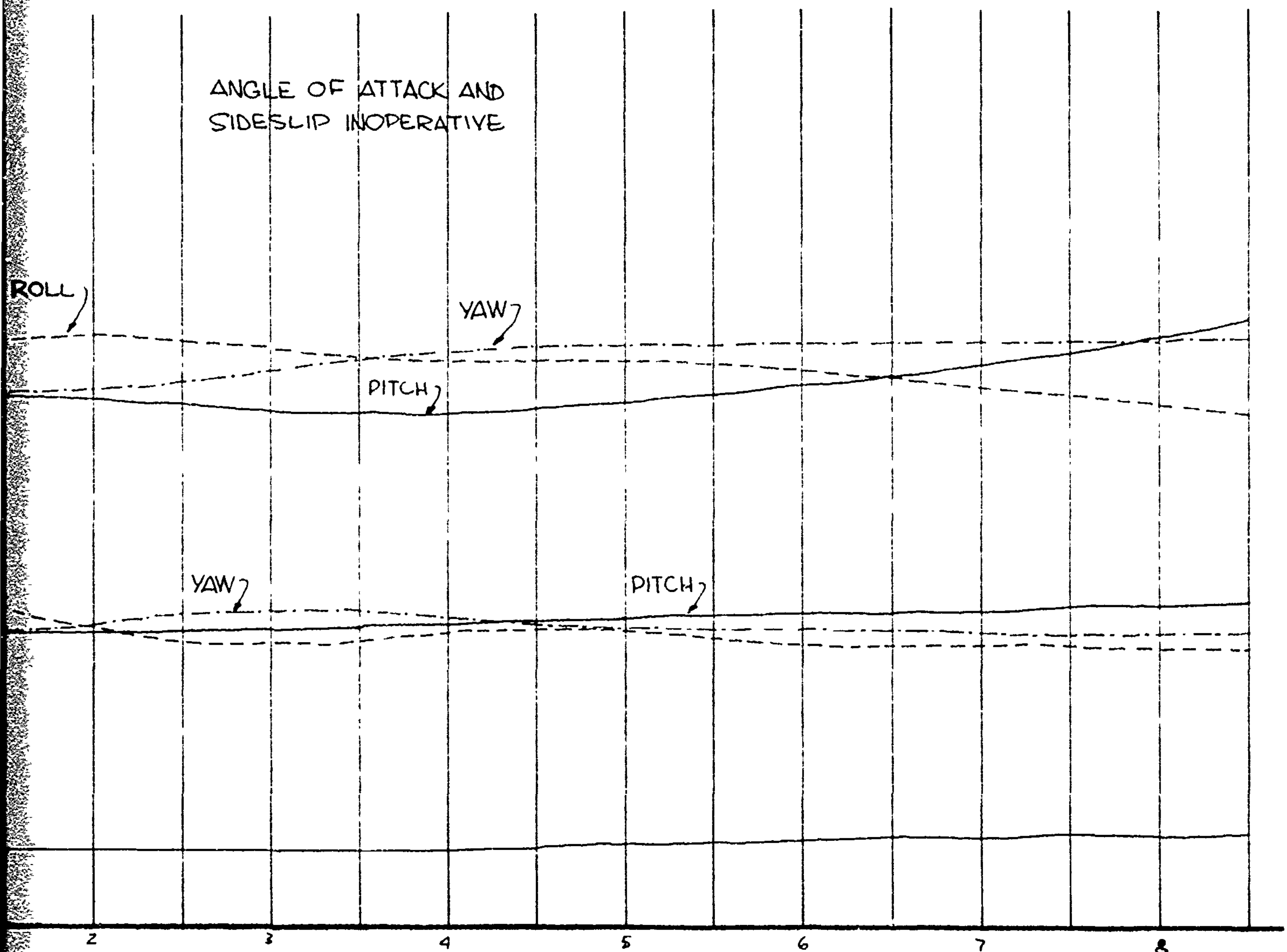


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FIGURE NO. 80

RIGHT LATERAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION : CLEAN
FULL LATERAL TRAVEL : 10.3 INCHES
AVERAGE GROSS WEIGHT : 2670 LBS.
LONG. C.G. LOCATION : 101.4 INCHES (AFT)
LATERAL C.G. LOCATION : 0.2 IN. (LT.)

FLIGHT CONDITION : LEVEL FLIGHT
TRIM CAS : 91.5 KNOTS
DENSITY ALTITUDE : 5400 FEET
ROTOR SPEED : 368 RPM
SAS CONDITION : ON

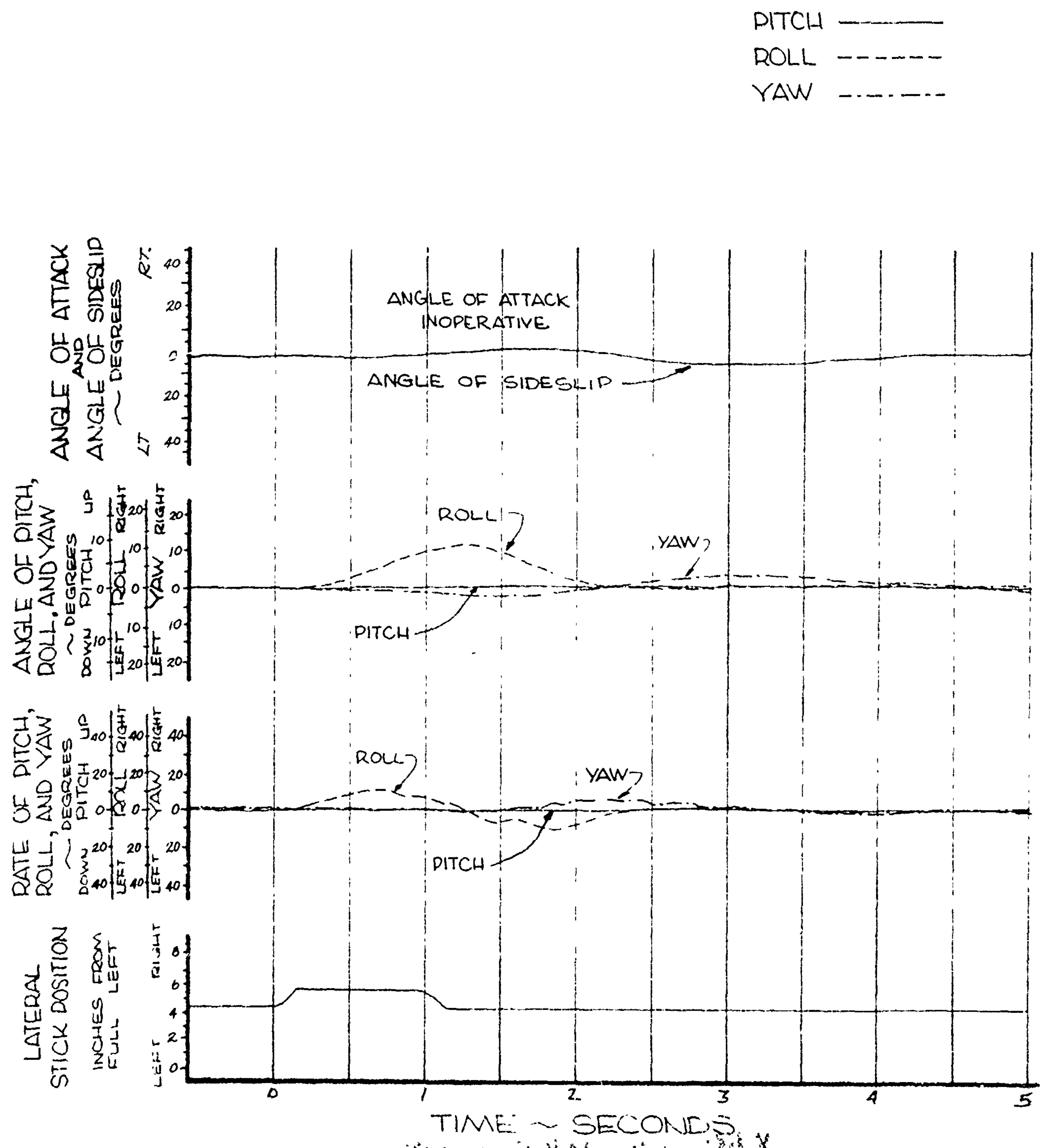


FIGURE NO. 81

RIGHT LATERAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION: CLEAN
FULL LATERAL TRAVEL: 10.3 INCHES
AVERAGE GROSS WEIGHT: 2720 LBS.
LONG. C.G. LOCATION: 101.4 INCHES (AFT)
LATERAL C.G. LOCATION: 0.2 IN. (LT)

FLIGHT CONDITION: CLIMB
TRIM CAS: 48.5 KNOTS
DENSITY ALTITUDE: 5000 FEET
ROTOR SPEED: 368 RPM
SAS CONDITION: ON

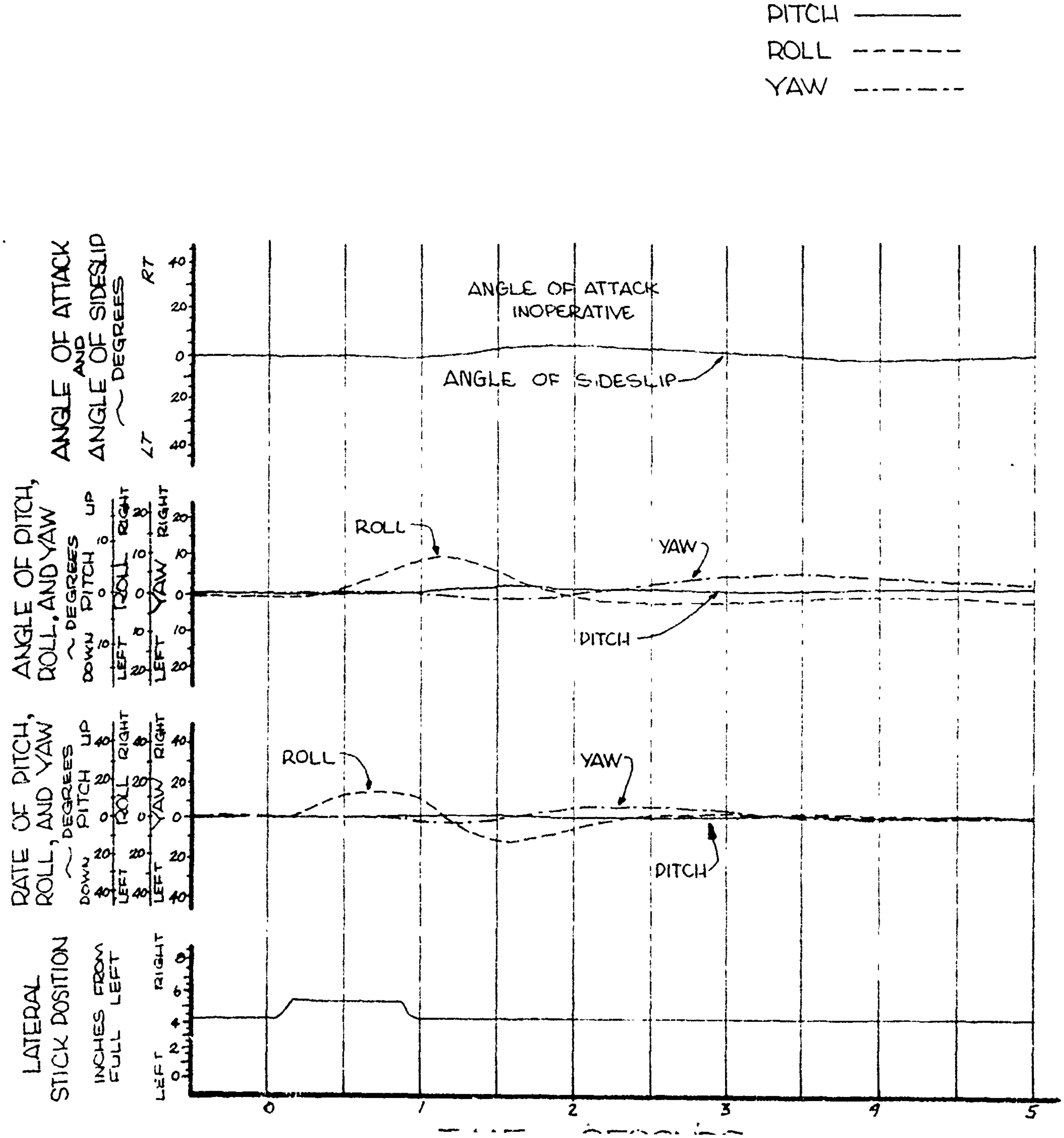


FIGURE NO. 82

RIGHT LATERAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION: CLEAN
FULL LATERAL TRAVEL: 10.3 INCHES
AVERAGE GROSS WEIGHT: 2690 LBS
LONG. C.G. LOCATION: 101.3 INCHES (AFT)
LATERAL C.G. LOCATION: 0.2 IN. (LT.)

FLIGHT CONDITION: AUTOROTATION
TRIM CAS: 55.5 KNOTS
DENSITY ALTITUDE: 5000 FEET
ROTOR SPEED: 368 RPM
SAS CONDITION: ON

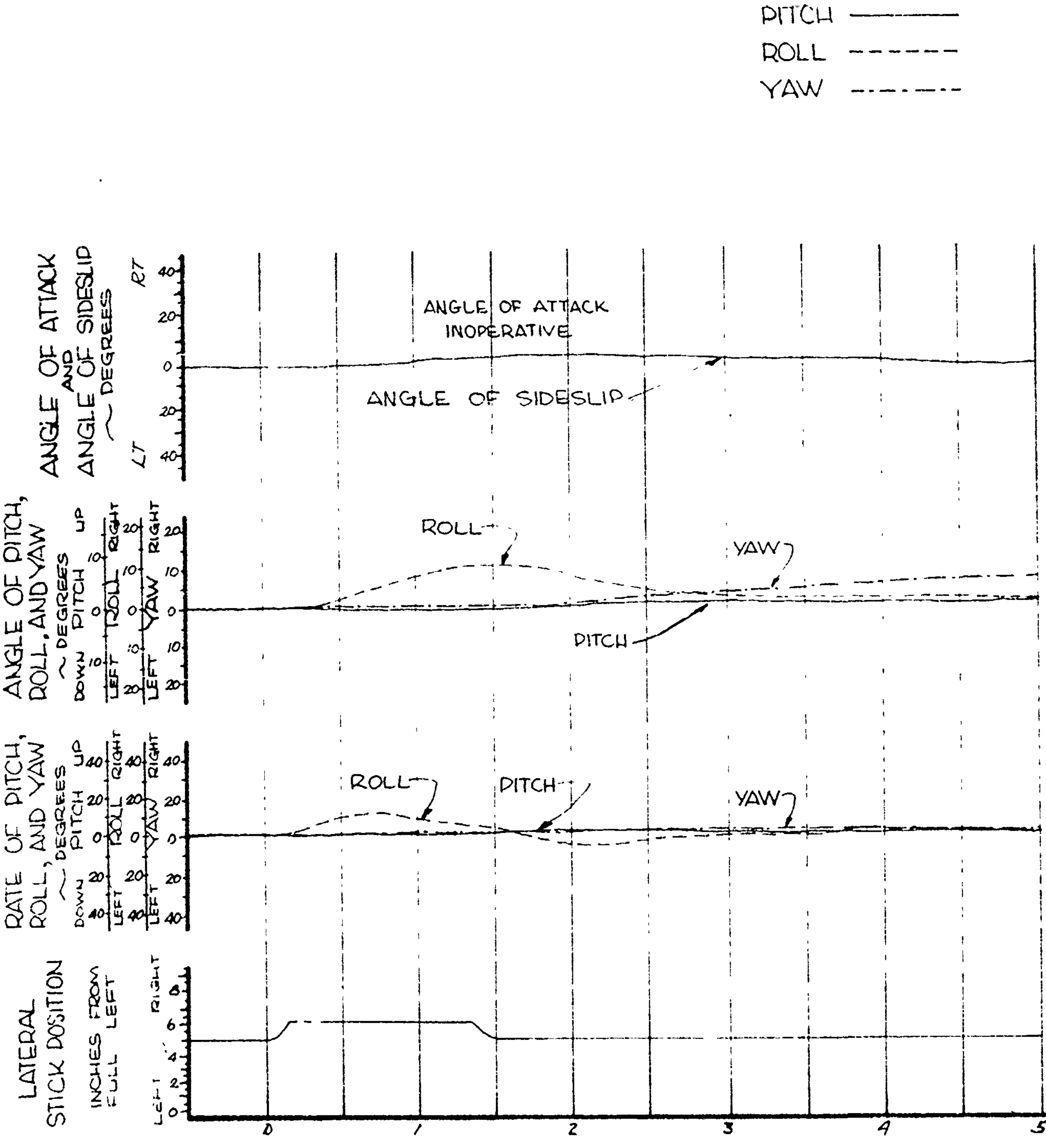


FIGURE NO. 83

RIGHT LATERAL PULSE

OH-5A, U.S.A., S/N 62-4209

CONFIGURATION : CLEAN
FULL LATERAL TRAVEL : 10.3 INCHES
AVERAGE GROSS WEIGHT : 2730 LBS.
LONG. C.G. LOCATION : 95.6 INCHES (FWD)
LATERAL C.G. LOCATION : 0.2 IN. (LT.)

FLIGHT CONDITION : HOVER (IGE)
TRIM CAS : ZERO
DENSITY ALTITUDE : 1500 FEET
ROTOR SPEED : 368 RPM
SAS CONDITION : ON

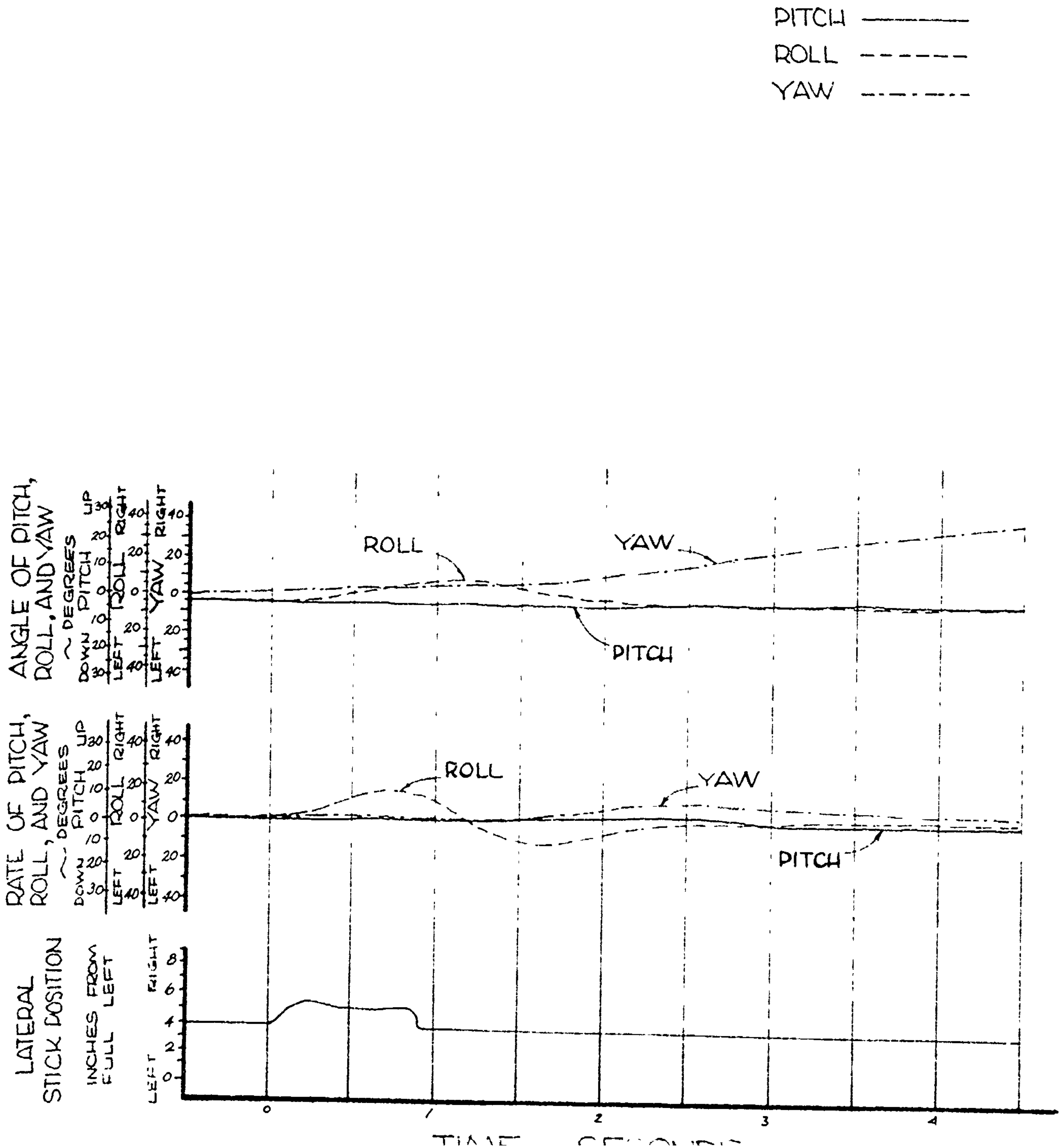


FIGURE NO. 84

RIGHT LATERAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION : CLEAN
FULL LATERAL TRAVEL : 10.3 INCHES
AVERAGE GROSS WEIGHT : 2680 LBS.
LONG. C.G. LOCATION : 95.4 INCHES (FWD)
LATERAL C.G. LOCATION : 0.2 IN. (LT.)

FLIGHT CONDITION : LEVEL FLIGHT
TRIM CAS : 93 KNOTS
DENSITY ALTITUDE : 4900 FEET
ROTOR SPEED : 368 RPM
SAS CONDITION : ON

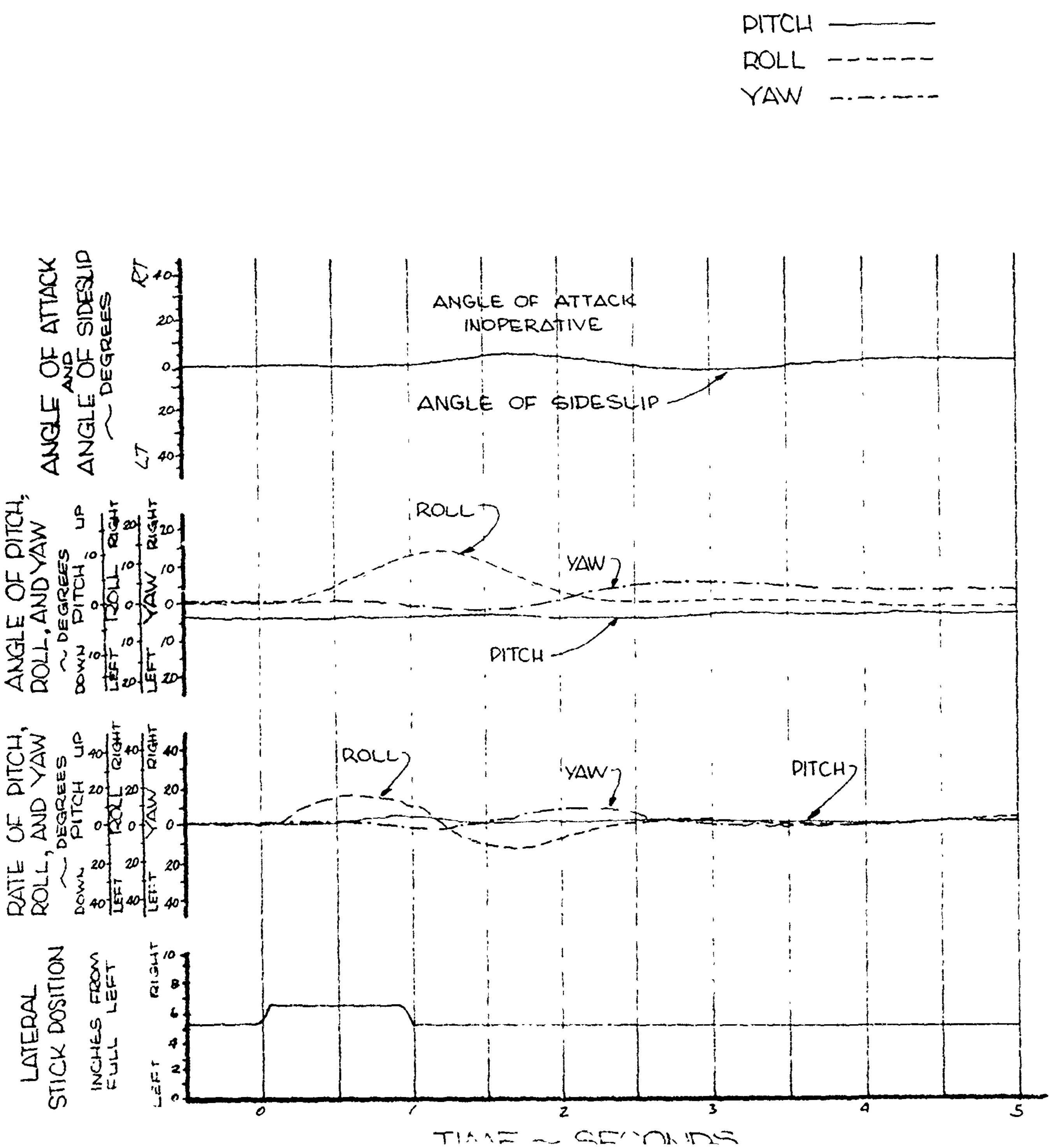


FIGURE NO. 85
RIGHT LATERAL PULSE
OH-5A, U.S.A., S/N 62-4210

CONFIGURATION : CLEAN
FULL LATERAL TRAVEL : 10.3 INCHES
AVERAGE GROSS WEIGHT : 2930 LBS.
LONG. C.G. LOCATION : 95.5 INCHES (FWD)
LATERAL C.G. LOCATION : 0.2 IN. (LT.)

FLIGHT CONDITION : LEVEL FLIGHT
TRIM CAS : 83 KNOTS
DENSITY ALTITUDE : 5100 FEET
ROTOR SPEED : 368 RPM
SAS CONDITION : ON

PITCH ————
ROLL ------
YAW -·-·-·-

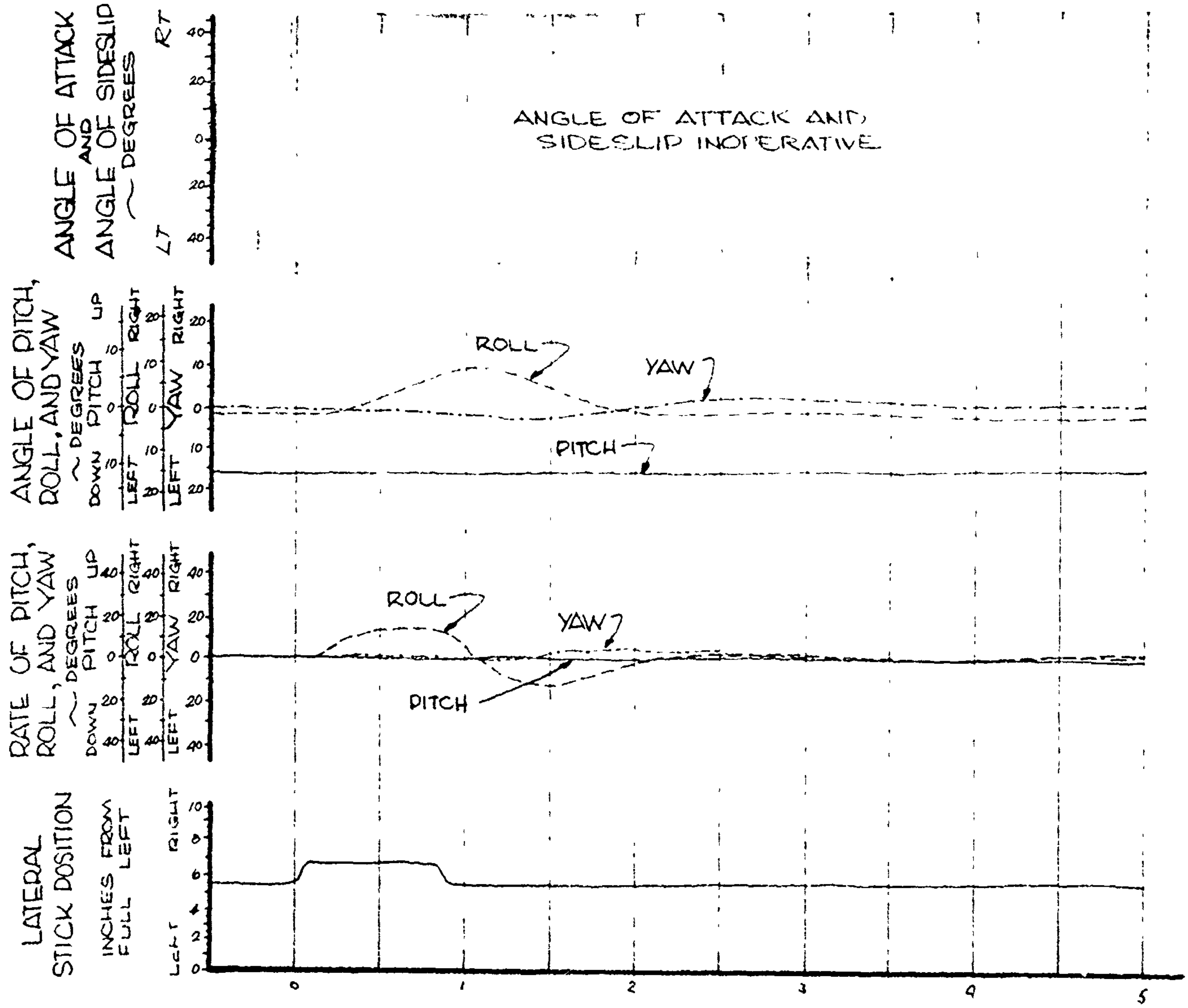


FIGURE NO. 86

RIGHT LATERAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION: CLEAN
FULL LATERAL TRAVEL: 10.3 INCHES
AVERAGE GROSS WEIGHT: 2660 LBS.
LONG. C.G. LOCATION: 101.3 INCHES (AFT)
LATERAL C.G. LOCATION: 0.2 IN. (LT.)

FLIGHT CONDITION: LEVEL FLIGHT
TRIM CAS: 75 KNOTS
DENSITY ALTITUDE: 10300 FEET
ROTOR SPEED: 368 RPM
SAS CONDITION: ON

PITCH ———
ROLL - - - - - -
YAW -·-·-·---

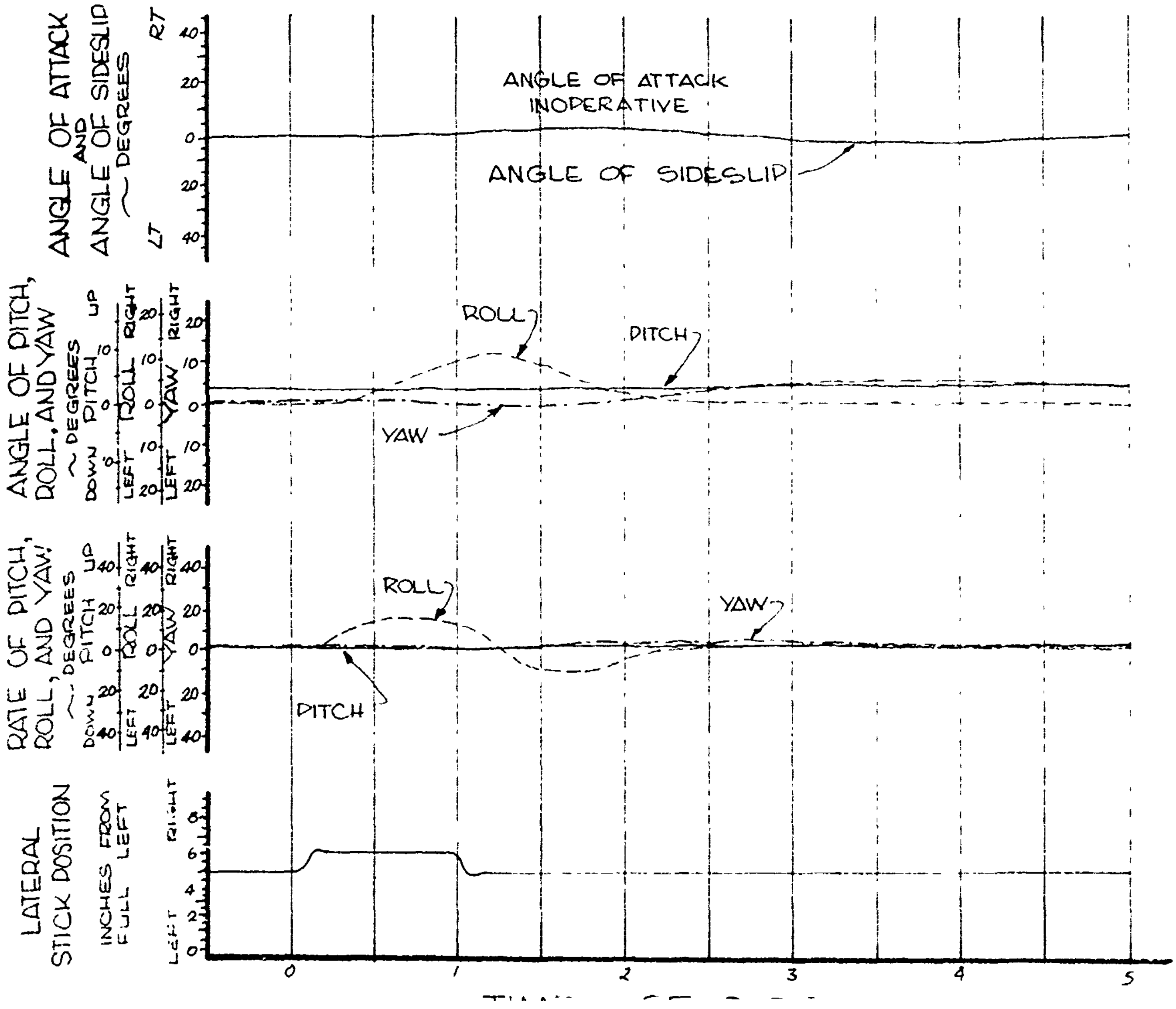
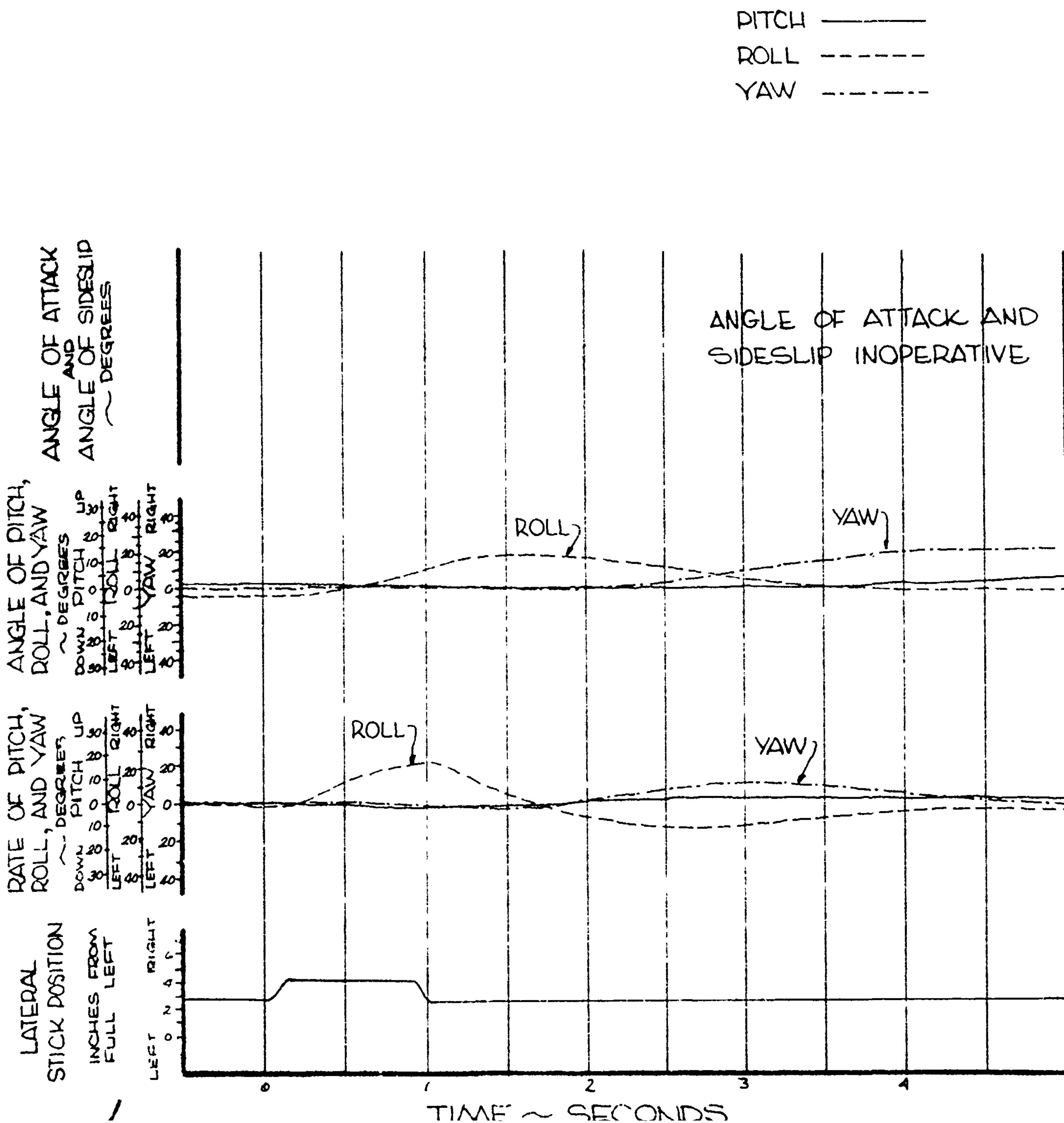


FIGURE NO. 87

RIGHT LATERAL PULSE

OH-5A, U.S.A., S/N 62-4209

CONFIGURATION : CLEAN
FLIGHT CONDITION : CLIMB (MAX. CONT. POWER
FULL LATERAL TRAVEL : 10.3 INCHES
TRIM CAS : 48 KNOTS
AVERAGE GROSS WEIGHT : 2700 LBS.
DENSITY ALTITUDE : 10,000 FEET
LONG. C.G. LOCATION : 101.4 INCHES (AFT)
ROTOR SPEED : 368 RPM
LATERAL C.G. LOCATION : 0.2 IN. (LT.)
SAS CONDITION : OFF



POWER)

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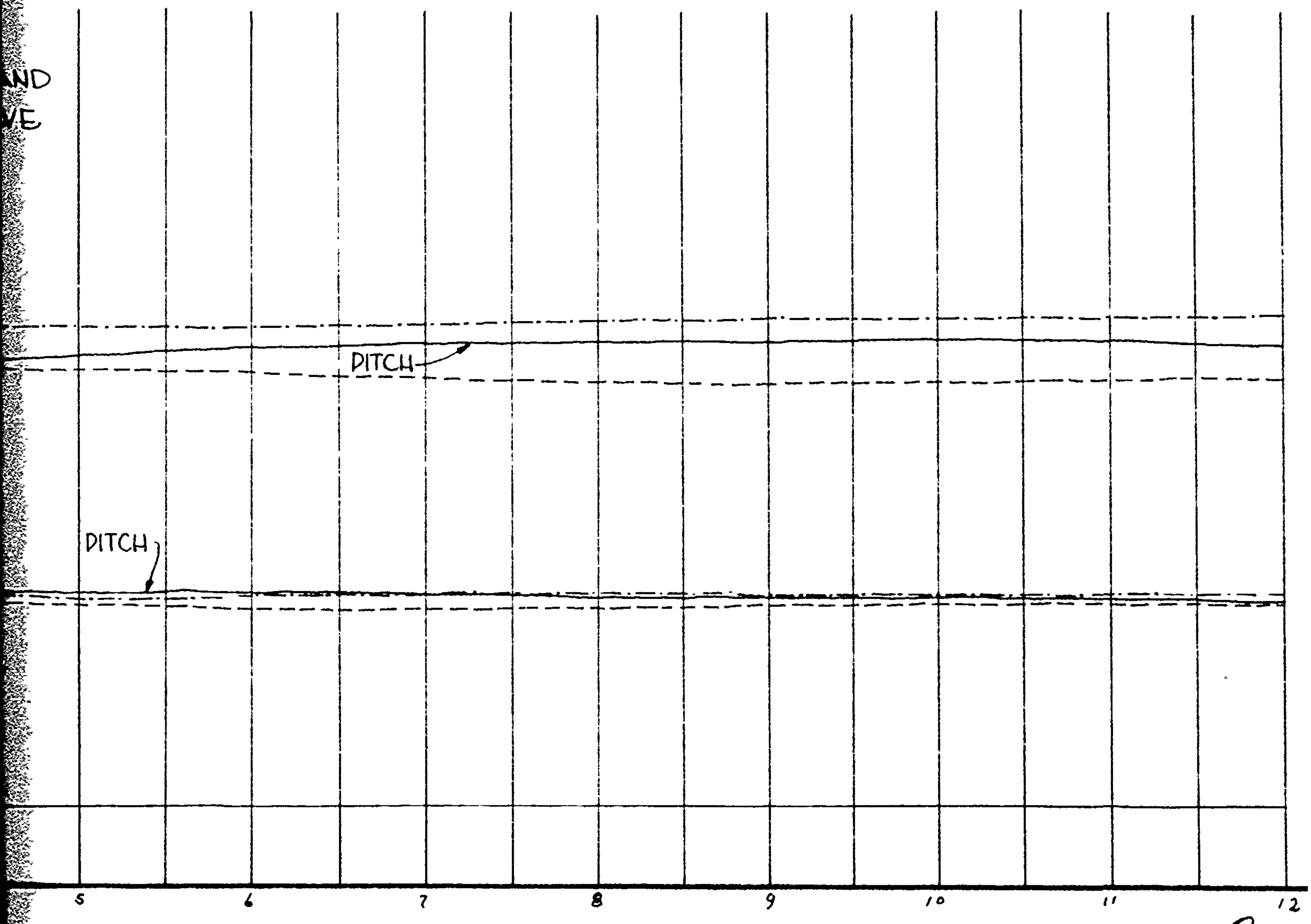

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FIGURE NO. 88
RIGHT LATERAL PULSE
OH-5A, U.S.A., S/N 62-4210

CONFIGURATION : XM-7
FULL LATERAL TRAVEL : 10.3 INCHES
AVERAGE GROSS WEIGHT : 2650 LBS.
LONG. C.G. LOCATION : 101.1 INCHES (AFT)
LATERAL C.G LOCATION : 1.1 IN. (LT)

FLIGHT CONDITION : LEVEL FLIGHT
TRIM CAS : 77 KNOTS
DENSITY ALTITUDE : 4600 FEET
ROTOR SPEED : 368 RPM
SAS CONDITION : ON

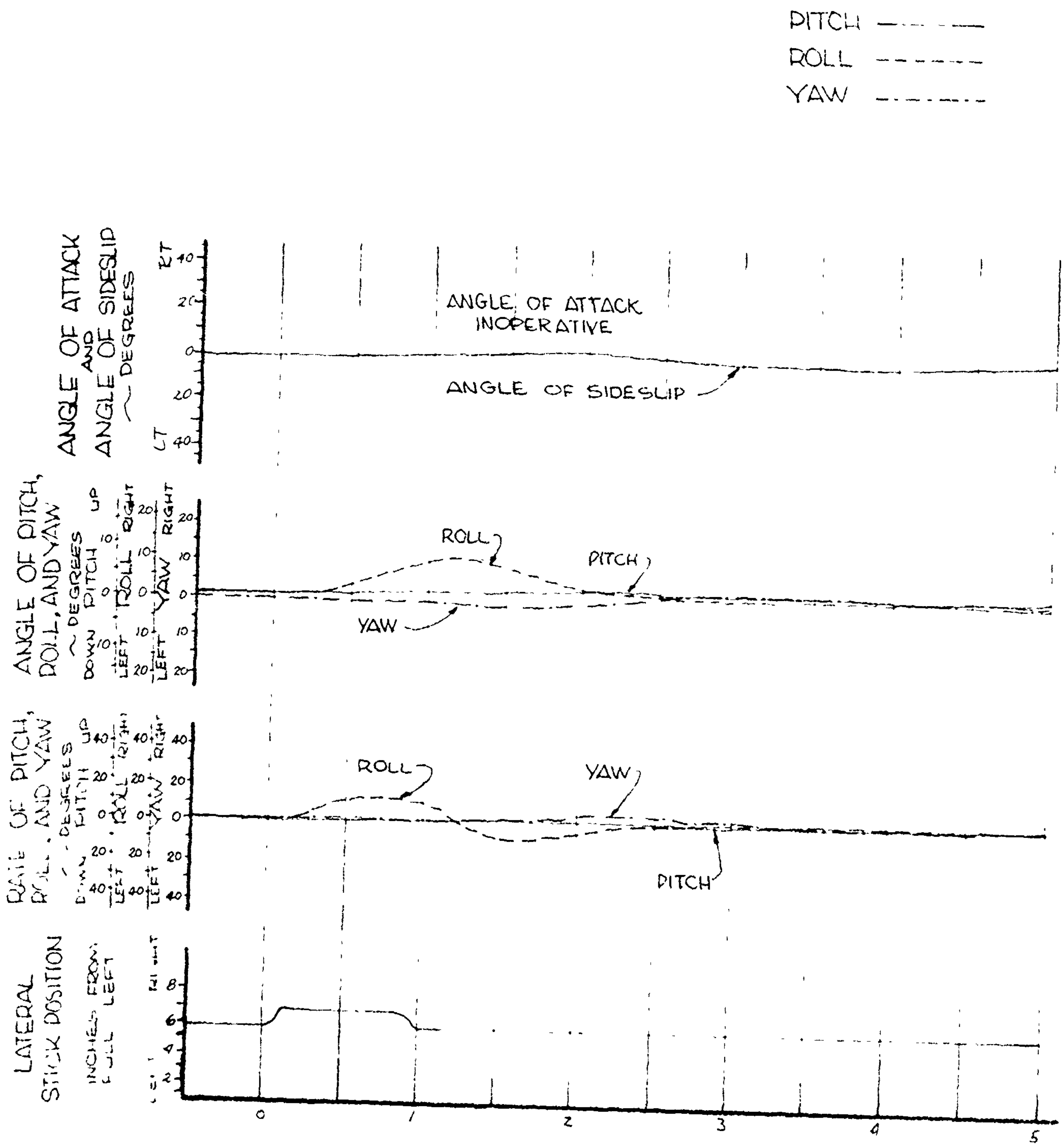


FIGURE NO. 89

RIGHT LATERAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION : XM-8
FULL LATERAL TRAVEL: 10.3 INCHES
AVERAGE GROSS WEIGHT: 2670 LBS.
LONG. C.G. LOCATION : 101.1 INCHES(AFT)
LATERAL C.G. LOCATION : 0 3 IN. (RT.)

FLIGHT CONDITION : LEVEL FLIGHT
TRIM CAS: 77 KNOTS
DENSITY ALTITUDE : 4800 FEET
ROTOR SPEED: 368 RPM
SAS CONDITION: ON

PITCH
ROLL
YAW

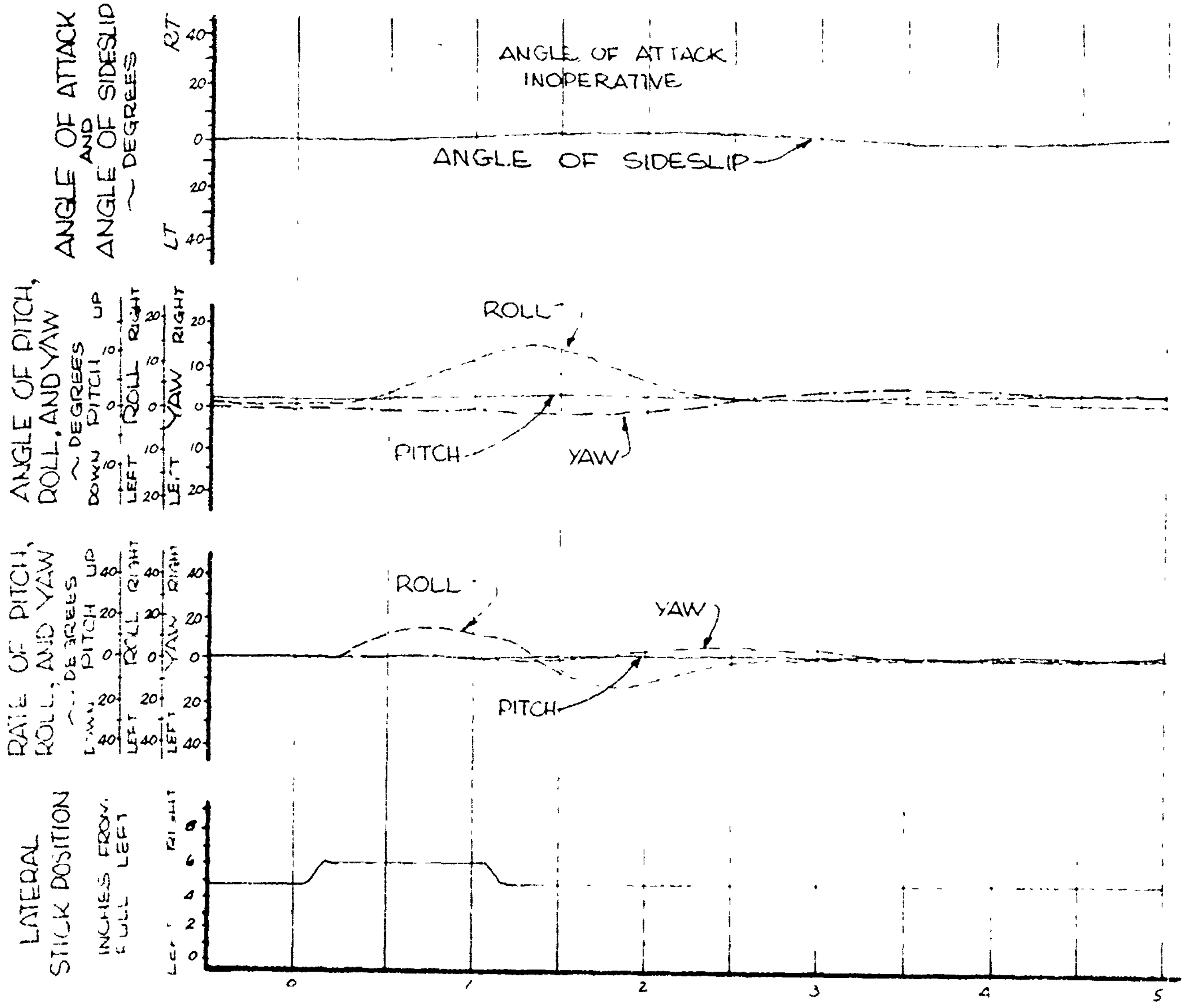


FIGURE NO. 90

RIGHT DIRECTIONAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION : CLEAN
FULL PEDAL TRAVEL : 4.5 INCHES
AVERAGE GROSS WEIGHT : 2675 LBS.
LONG. C.G. LOCATION : 101.3 INCHES (AFT)
LATERAL C.G. LOCATION : 0.2 IN. (LT)

FLIGHT CONDITION : HOVER (IGE)
TRIM CAS : ZERO
DENSITY ALTITUDE : 1700 FEET
ROTOR SPEED : 368 RPM
SAS CONDITION : ON

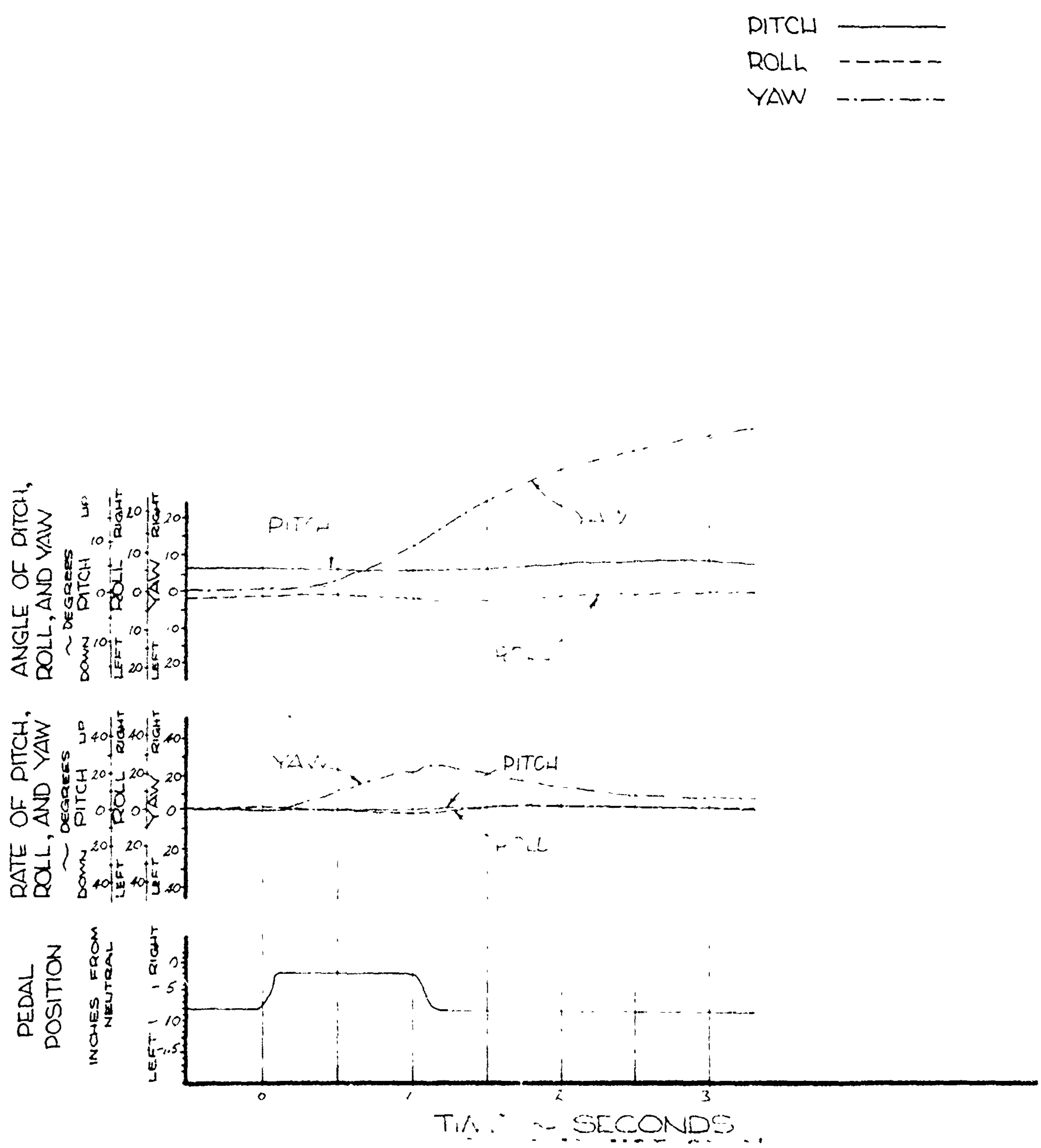


FIGURE NO. 91

RIGHT DIRECTIONAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION: CLEAN
FULL PEDAL TRAVEL: 4.50 INCHES
AVERAGE GROSS WEIGHT: 2670 LBS.
LONG. C.G. LOCATION: 101.3 INCHES (AFT)
LATERAL C.G. LOCATION: 0.2 IN. (LT.)

FLIGHT CONDITION: LEVEL FLIGHT
TRIM CAS: 35 KNOTS
DENSITY ALTITUDE: 5100 FEET
ROTOR SPEED: 368 RPM
SAS CONDITION: ON

PITCH ————
ROLL - - - - - -
YAW -·-·-·-

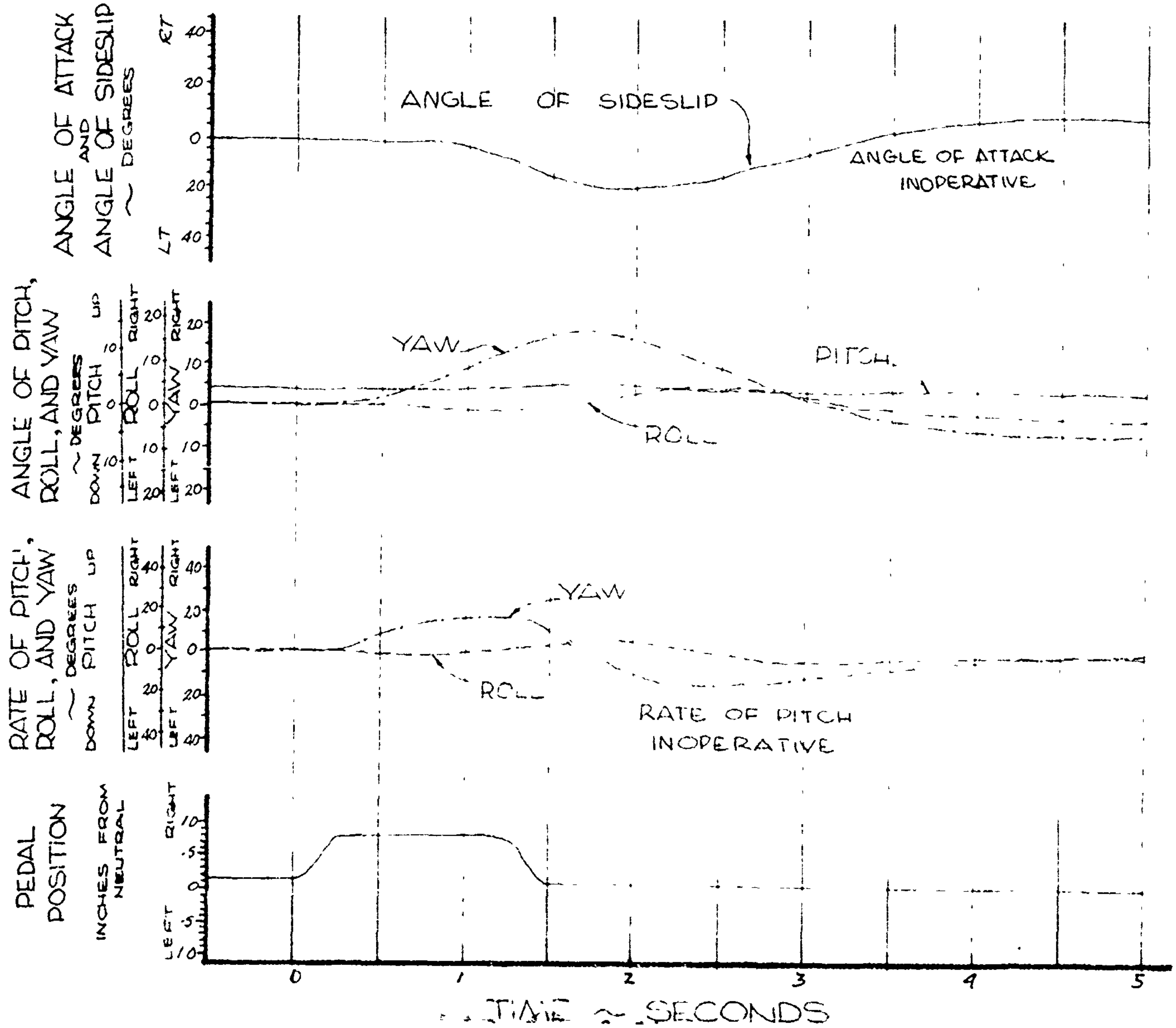
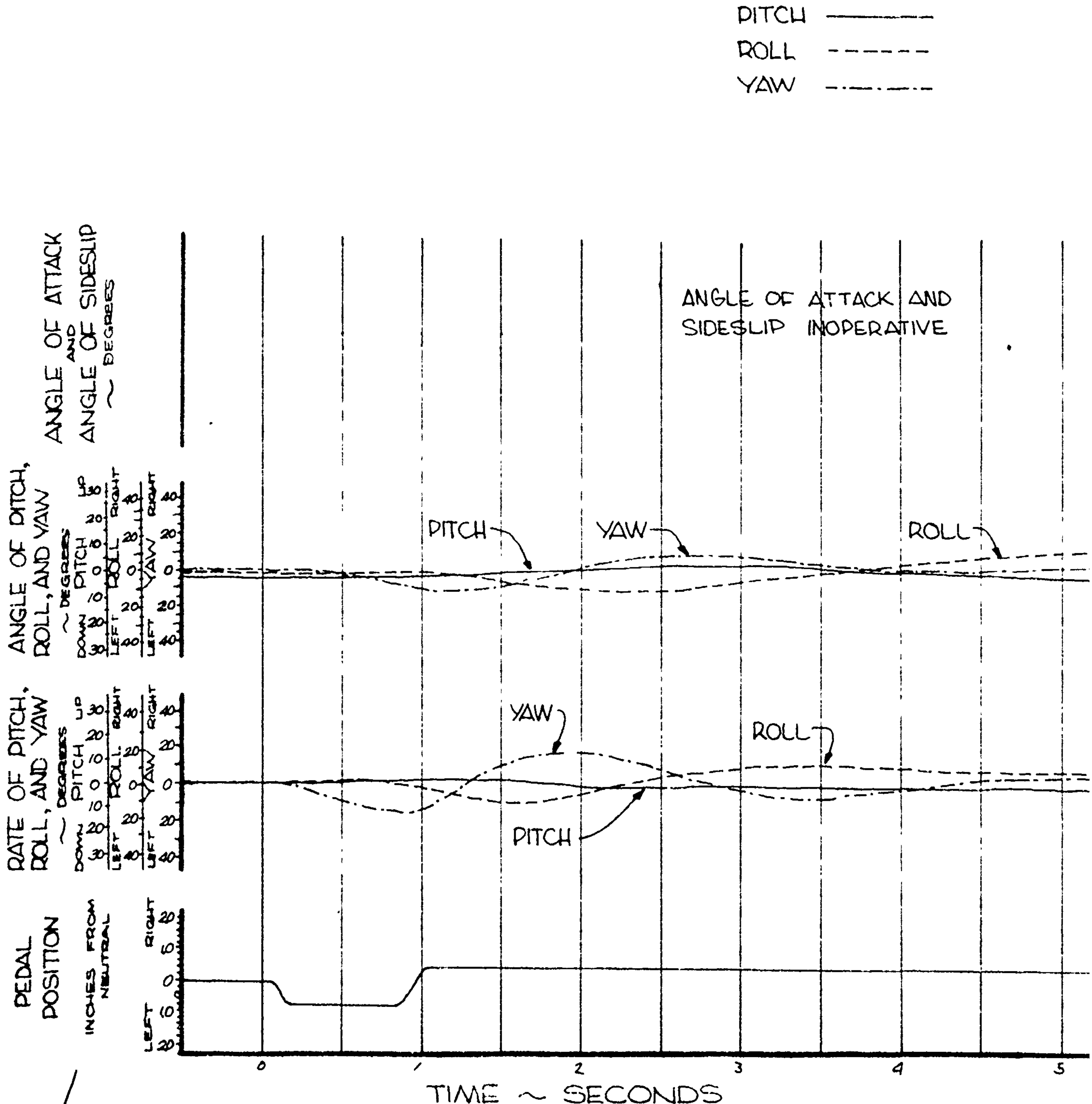


FIGURE NO. 92

LEFT DIRECTIONAL PULSE

OH-5A, U.S.A., S/N 62-4209

CONFIGURATION : CLEAN
FLIGHT CONDITION : LEVEL FLIGHT
FULL PEDAL TRAVEL : 4.50 INCHES
TRIM CAS : 79 KNOTS
AVERAGE GROSS WEIGHT : 2670 LBS.
DENSITY ALTITUDE : 5800 FEET
LONG. C.G. LOCATION : 101.4 INCHES (AFT)
ROTOR SPEED : 368 RPM
LATERAL C.G. LOCATION : 0.2 IN. (LT.)
SAS CONDITION : OFF



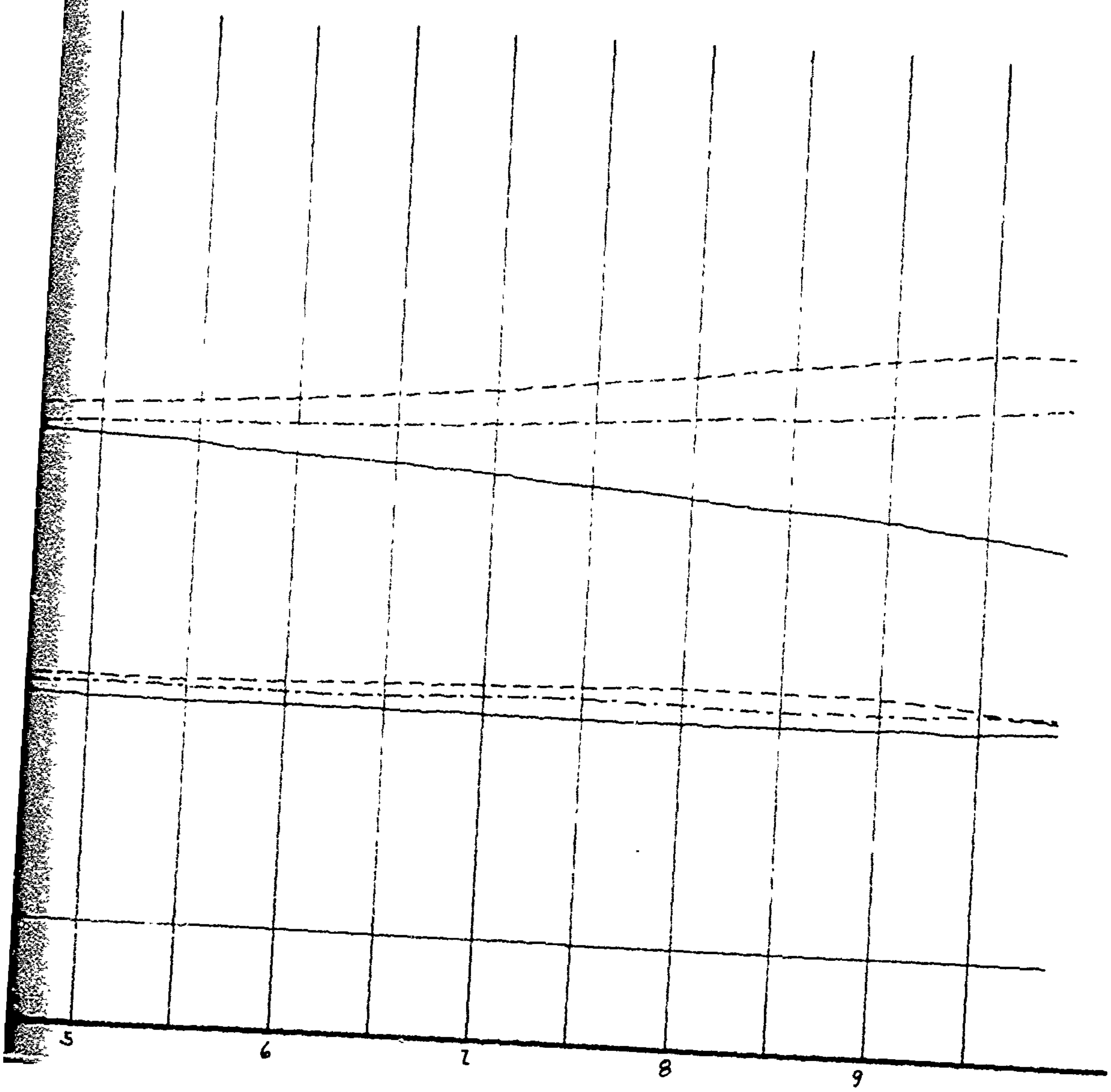


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FIGURE NO. 93

RIGHT DIRECTIONAL PULSE

CH-5A, U.S.A., S/N 62-4210

CONFIGURATION : CLEAN
FULL PEDAL TRAVEL : 4.5 INCHES
AVERAGE GROSS WEIGHT : 2680 LBS.
LONG. C.G. LOCATION : 101.4 INCHES (AFT)
LATERAL C.G. LOCATION : 0.2 IN. (LT)

FLIGHT CONDITION : LEVEL FLIGHT
TRIM CAS: 91.5 KNOTS
DENSITY ALTITUDE : 5400 FEET
ROTOR SPEED : 368 RPM
SAS CONDITION : ON

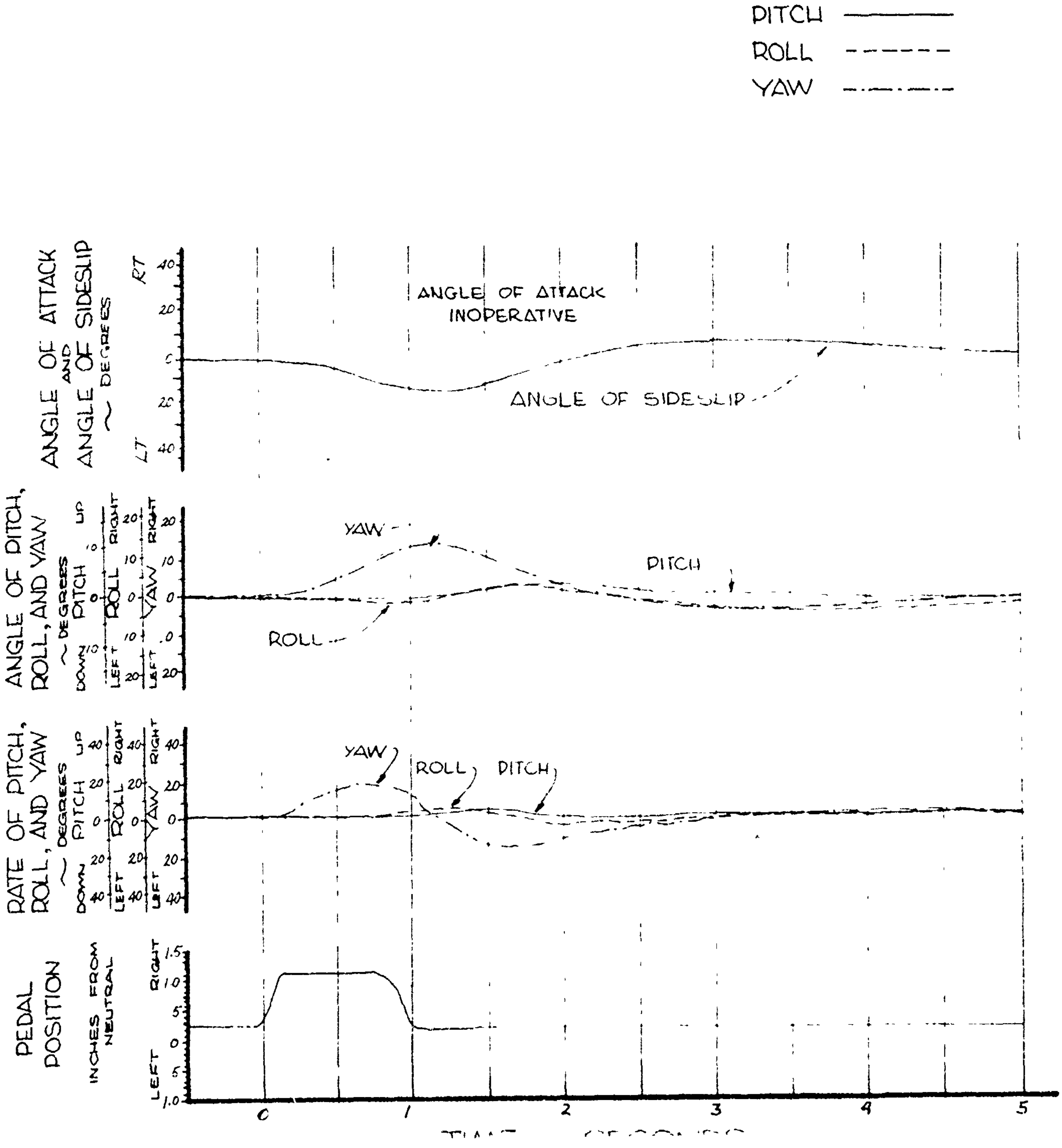


FIGURE NO. 94

RIGHT DIRECTIONAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION: CLEAN
FULL PEDAL TRAVEL: 4.50 INCHES
AVERAGE GROSS WEIGHT: 2680 LBS.
LONG. C.G. LOCATION: 101.3 INCHES(AFT)
LATERAL C.G. LOCATION: 0.2 IN. (LT.)

FLIGHT CONDITION: CLIMB (MAX CONT POWER)
TRIM CAS: 48.5 KNOTS
DENSITY ALTITUDE: 5000 FEET
ROTOR SPEED: 368 RPM
SAS CONDITION: ON

PITCH ————
ROLL ------
YAW -·-·-·-

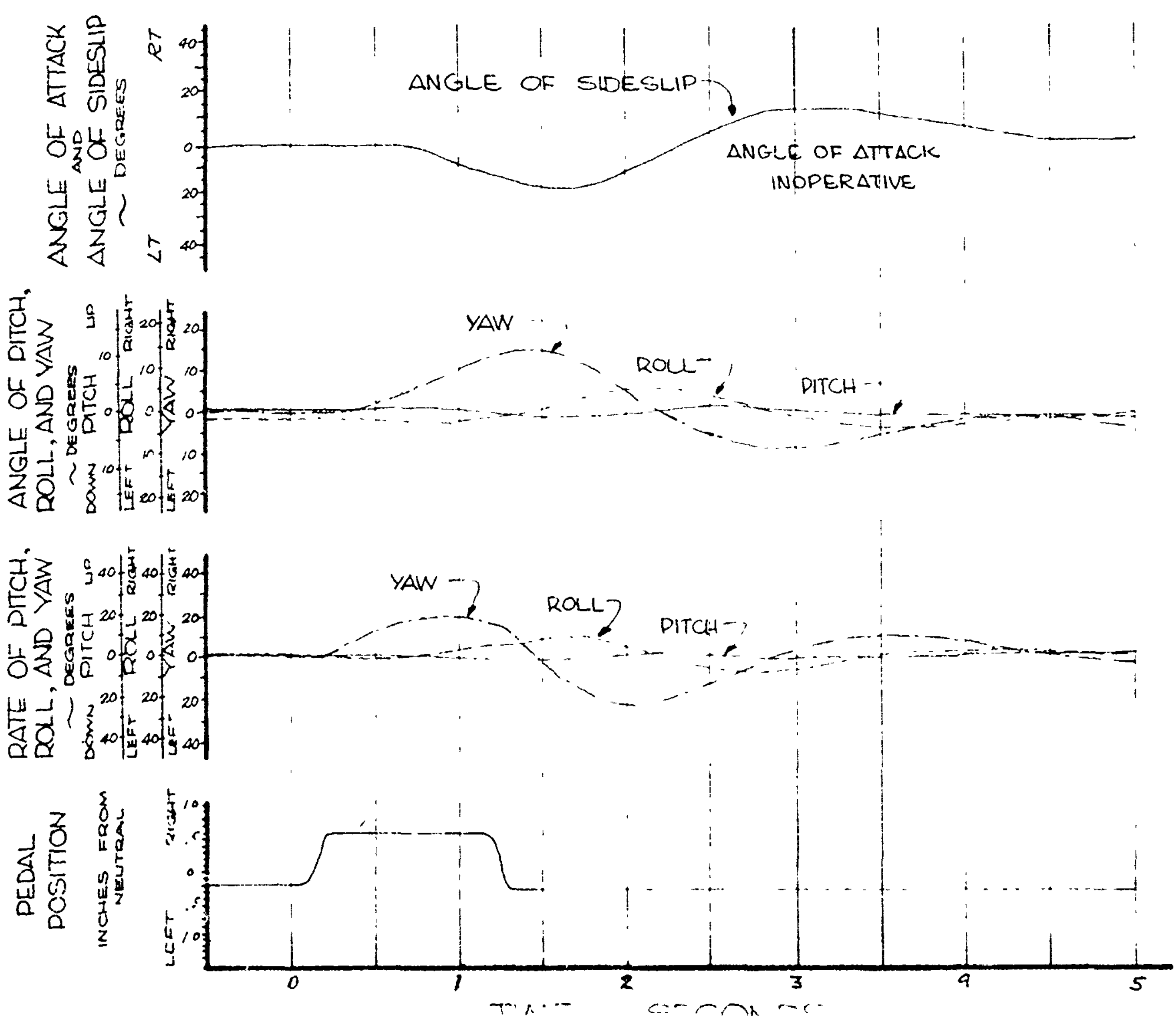


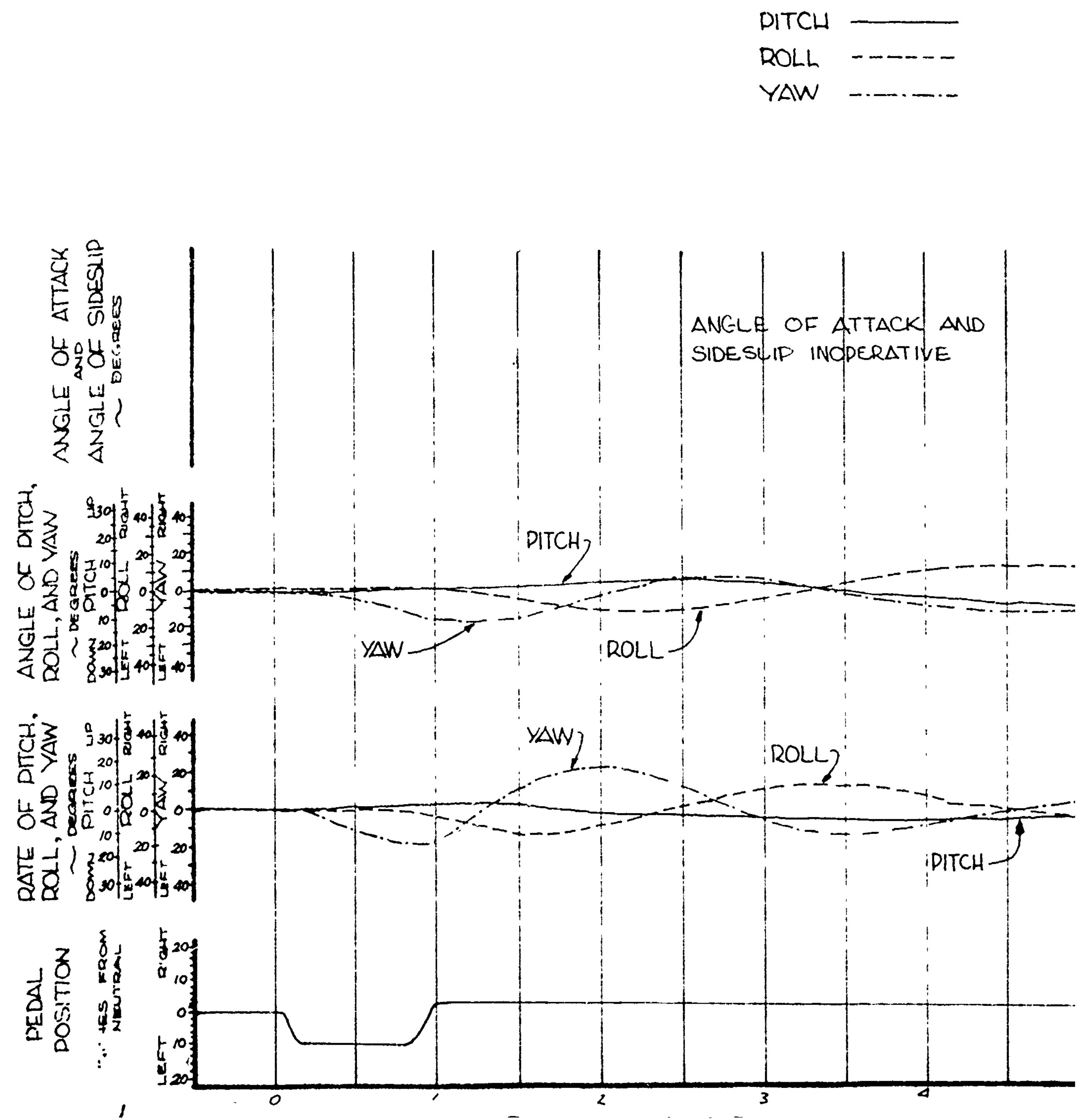
FIGURE NO. 95

LEFT DIRECTIONAL PULSE

OH-5A, U.S.A., S/N 62-4209

CONFIGURATION : CLEAN
FULL PEDAL TRAVEL : 4.50 IN.(LT.)
AVERAGE GROSS WEIGHT : 2740 LBS.
LONG. C.G. LOCATION : 101.4 INCHES(AFT)
LATERAL C.G. LOCATION : 0.2 IN.(LT.)

FLIGHT CONDITION : CLIMB (MAX CONT POWE
TRIM CAS : 48.5 KNOTS
DENSITY ALTITUDE : 5000 FEET
ROTOR SPEED : 368 RPM
SAS CONDITION : OFF



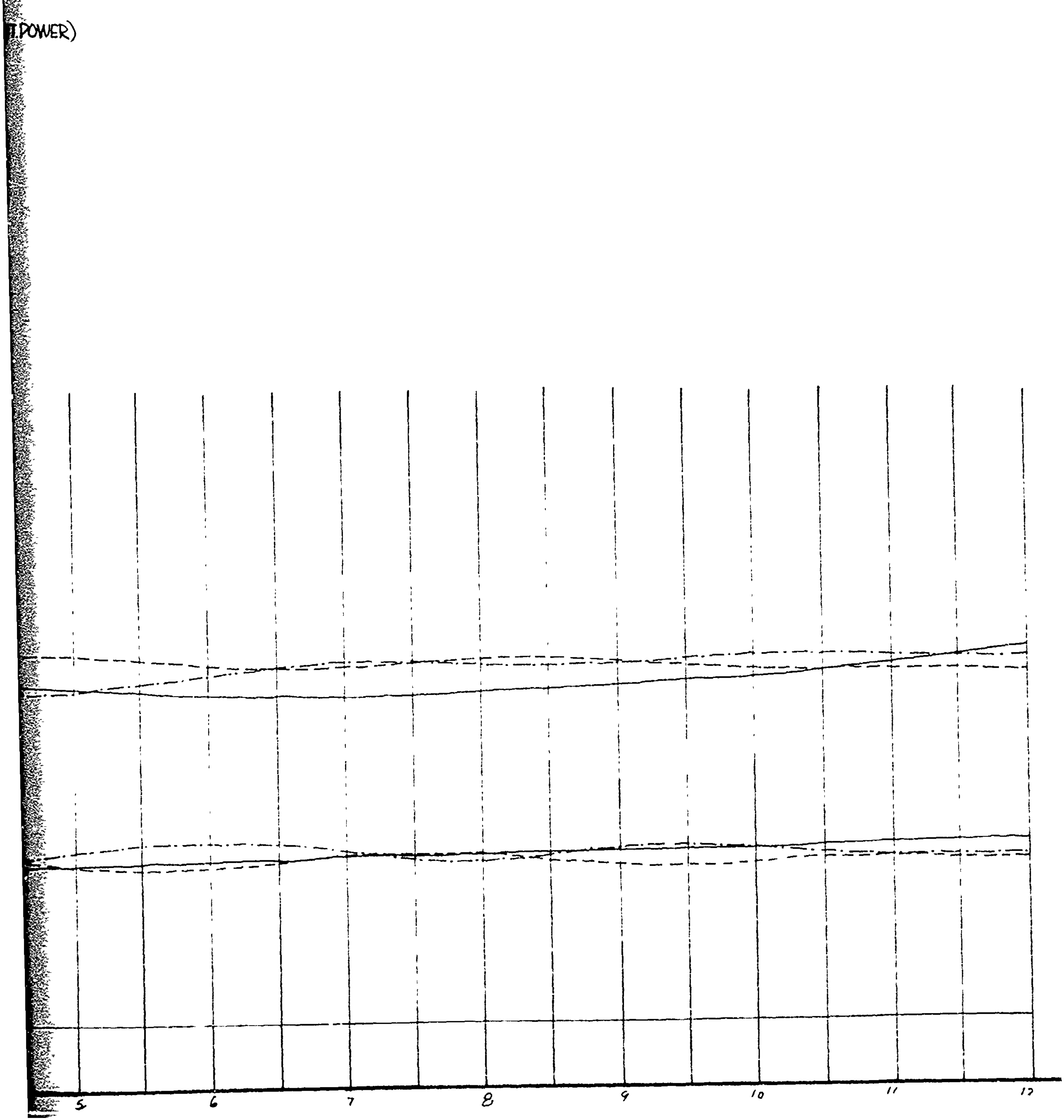


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FIGURE NO. 96

RIGHT DIRECTIONAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION: CLEAN
FULL PEDAL TRAVEL: 4.50 INCHES
AVERAGE GROSS WEIGHT: 2660 LBS.
LONG. C.G. LOCATION: 101.3 INCHES (AFT)
LATERAL C.G. LOCATION: 0.2 IN. (LT)

FLIGHT CONDITION: AUTOROTATION
TRIM CAS: 55.5 KNOTS
DENSITY ALTITUDE: 5000 FEET
ROTOR SPEED: 368 RPM
SAS CONDITION: ON

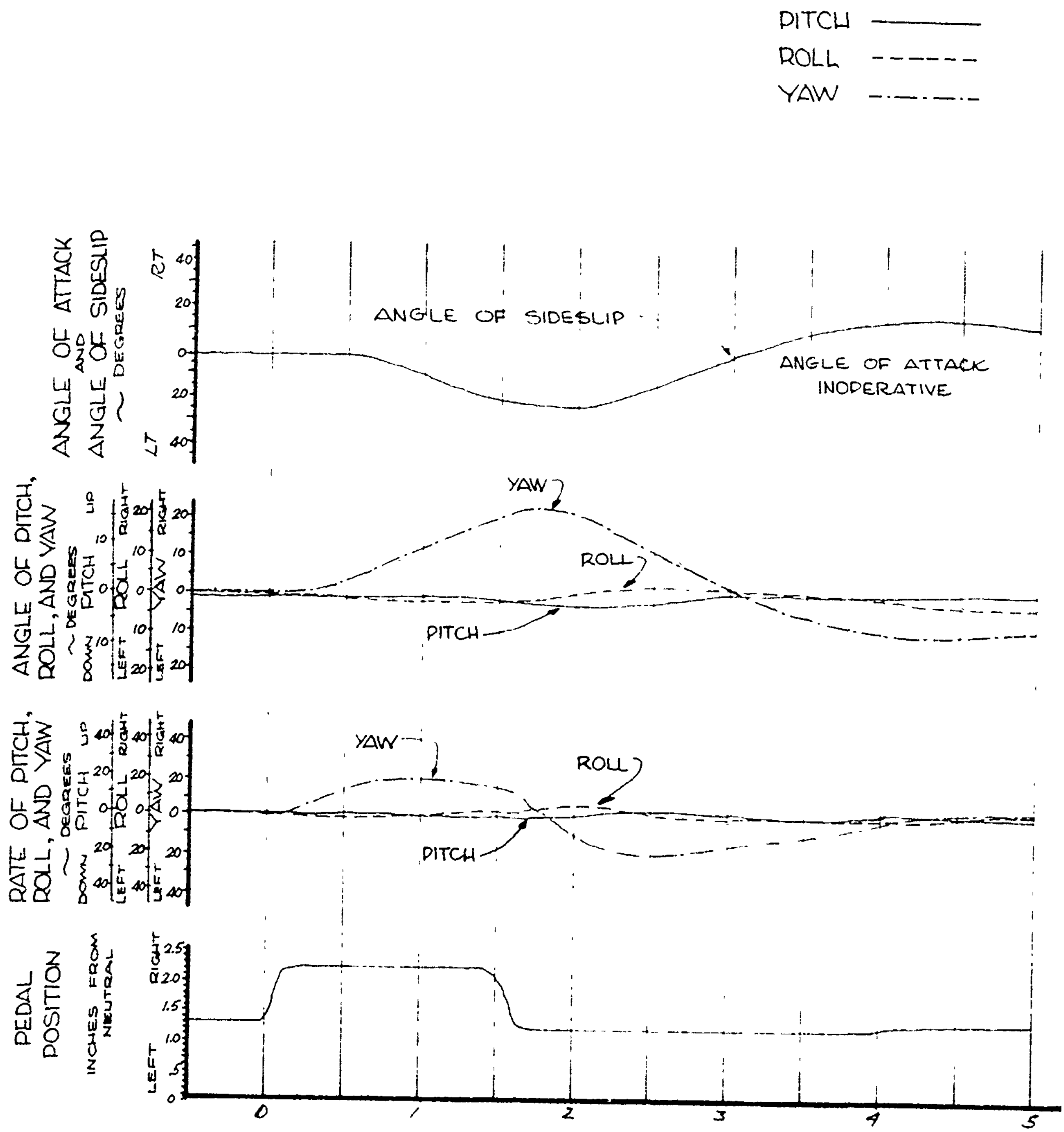


FIGURE NO. 97

RIGHT DIRECTIONAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION : CLEAN
FULL PEDAL TRAVEL : 4.5 INCHES
AVERAGE GROSS WEIGHT : 2750 LBS.
LONG. C.G. LOCATION : 95.6 INCHES (FWD)
LATERAL C.G. LOCATION : 0.2 IN. (LT.)

FLIGHT CONDITION : HOVER (IGE)
TRIM CAS : ZERO
DENSITY ALTITUDE : 1300 FEET
ROTOR SPEED : 368 RPM
SAS CONDITION : ON

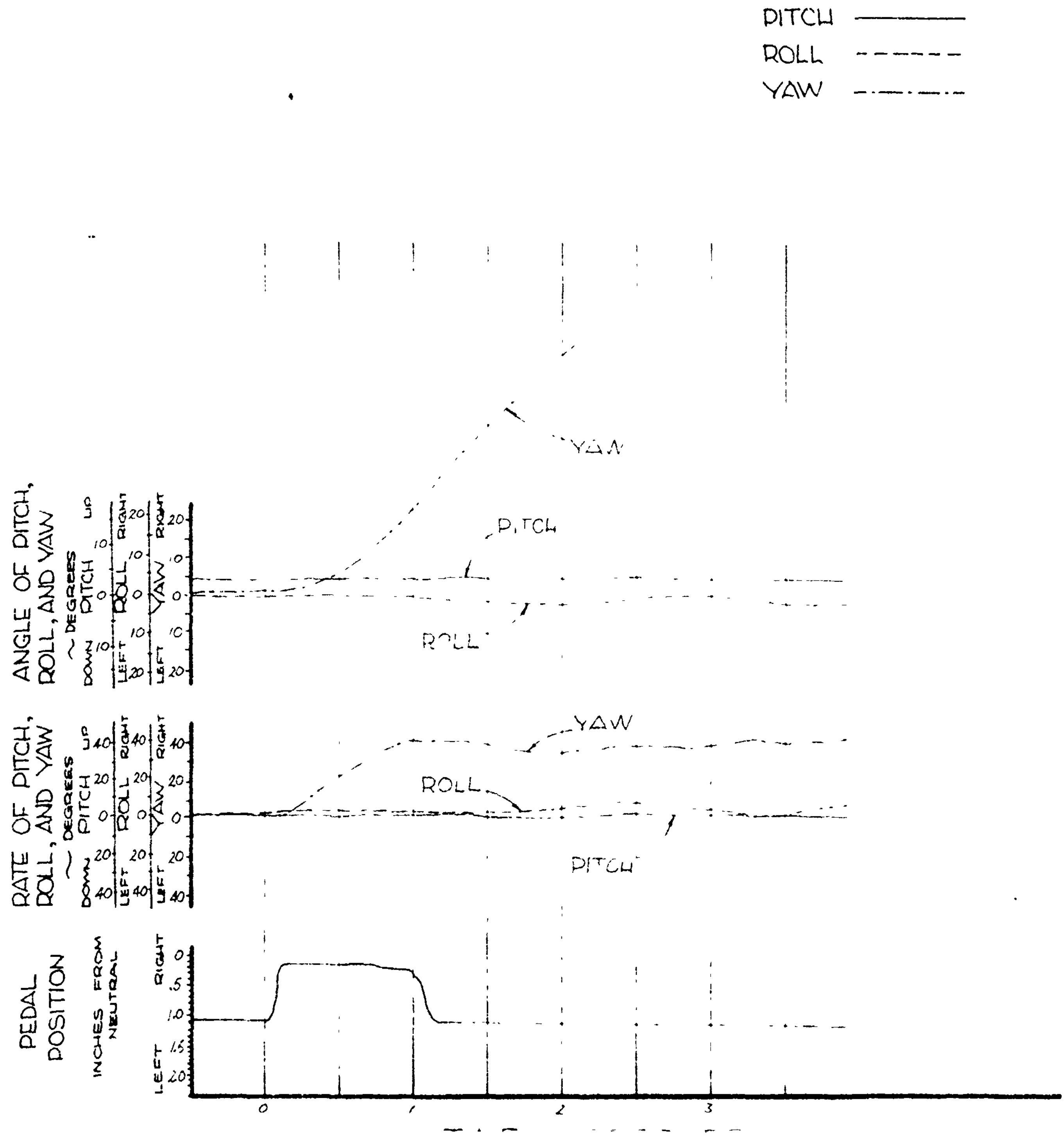


FIGURE NO. 98

RIGHT DIRECTIONAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION: CLEAN
FULL PEDAL TRAVEL: 4.5 INCHES
AVERAGE GROSS WEIGHT: 2670 LBS.
LONG. C.G. LOCATION: 95.4 INCHES (FWD)
LATERAL C.G. LOCATION: 0.2 IN. (LT.)

FLIGHT CONDITION: LEVEL FLIGHT
TRIM CAS: 93 KNOTS
DENSITY ALTITUDE: 4900 FEET
ROTOR SPEED: 368 RPM
SAS CONDITION: ON

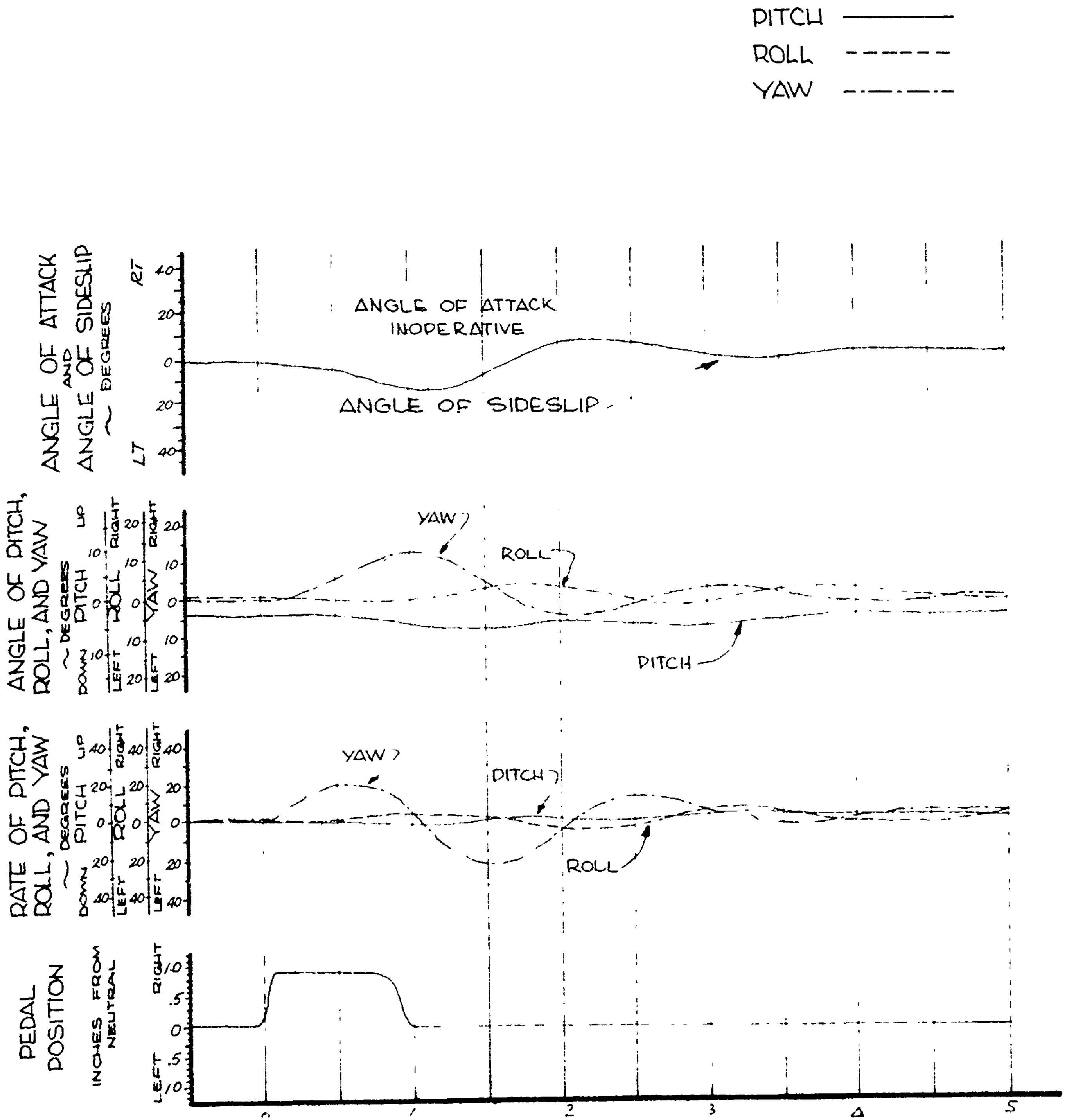


FIGURE NO. 99

RIGHT DIRECTIONAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION: CLEAN
FULL PEDAL TRAVEL: 4.5 INCHES
AVERAGE GROSS WEIGHT: 2900 LBS.
LONG. C.G. LOCATION: 95.5 INCHES (FWD)
LATERAL C.G. LOCATION: 0.2 IN. (LT.)

FLIGHT CONDITION: LEVEL FLIGHT
TRIM CAS: 83 KNOTS
DENSITY ALTITUDE: 5100 FEET
ROTOR SPEED: 368 RPM
SAS CONDITION: ON

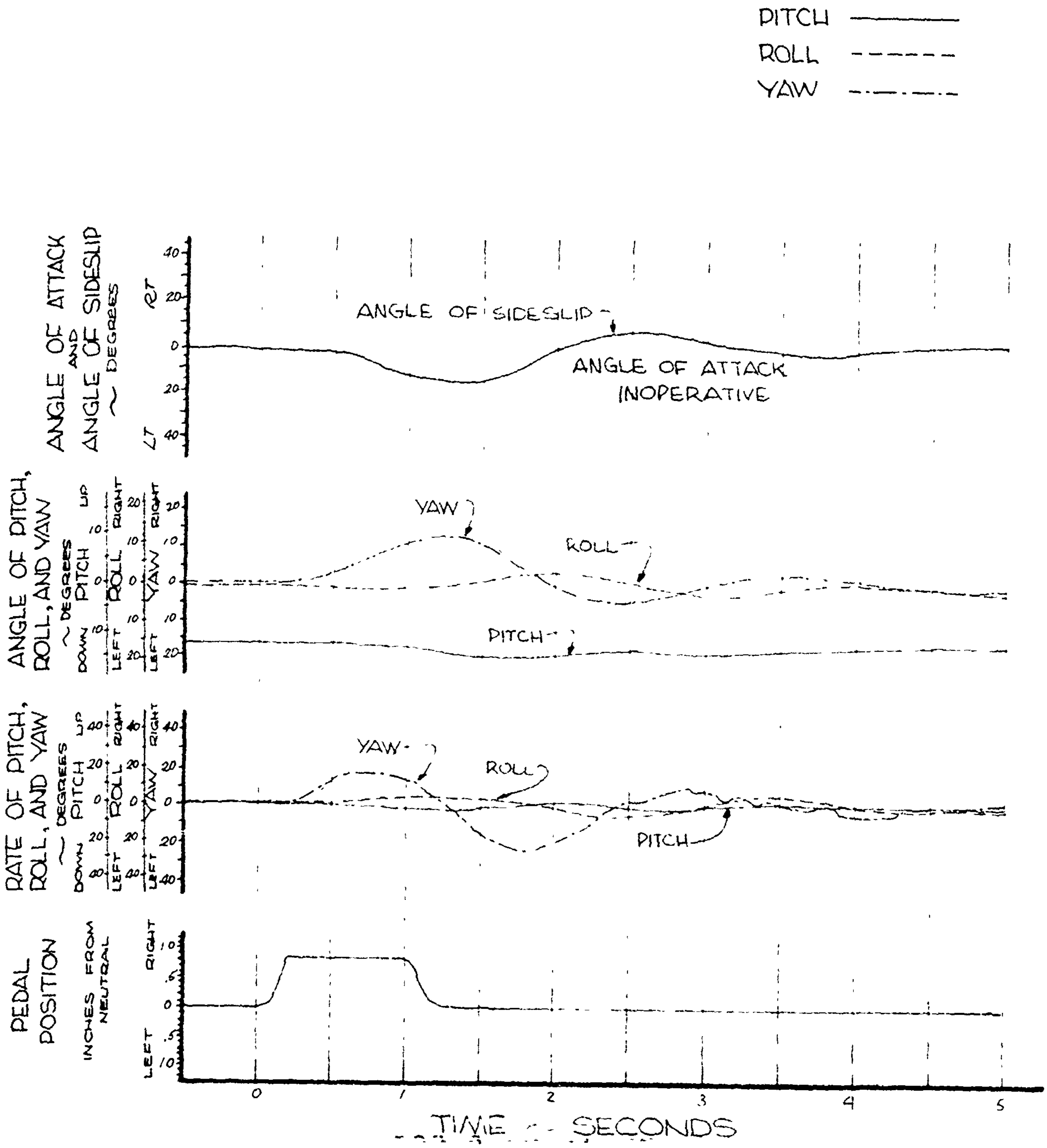


FIGURE NO. 100

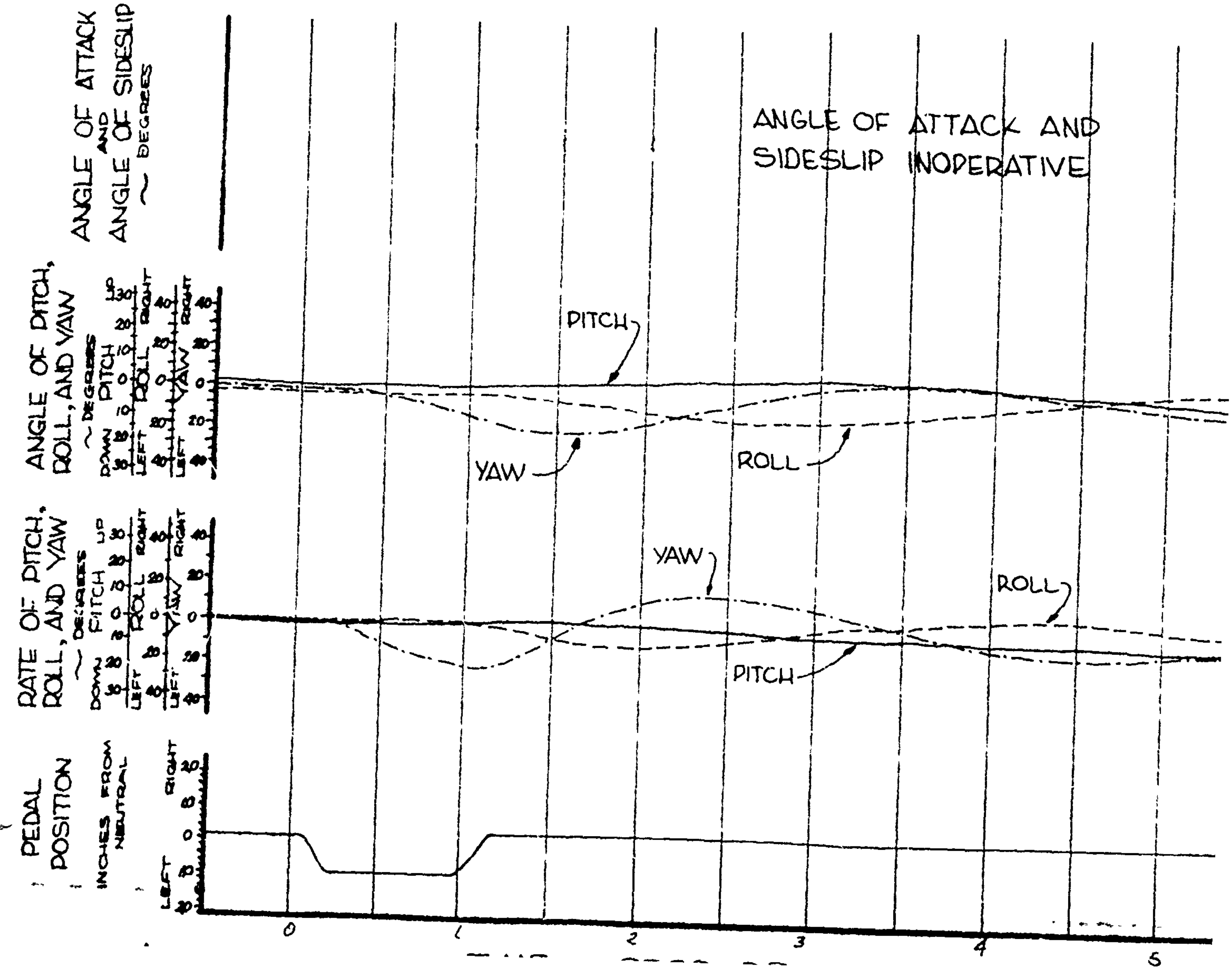
LEFT DIRECTIONAL PULSE

OH-5A, U.S.A., S/N 62-4209

CONFIGURATION : CLEAN
FULL PEDAL TRAVEL : 4.50 INCHES
AVERAGE GROSS WEIGHT : 2700 LBS.
LONG. C.G. LOCATION : 101.4 INCHES (AFT)
LATERAL C.G. LOCATION : 0.2 IN. (LT.)

FLIGHT CONDITION : LEVEL FLIGHT
TRIM CAS : 35 KNOTS
DENSITY ALTITUDE : 9900 FEET
ROTOR SPEED : 368 RPM
SAS CONDITION : OFF

PITCH ————
ROLL ------
YAW —·—·—



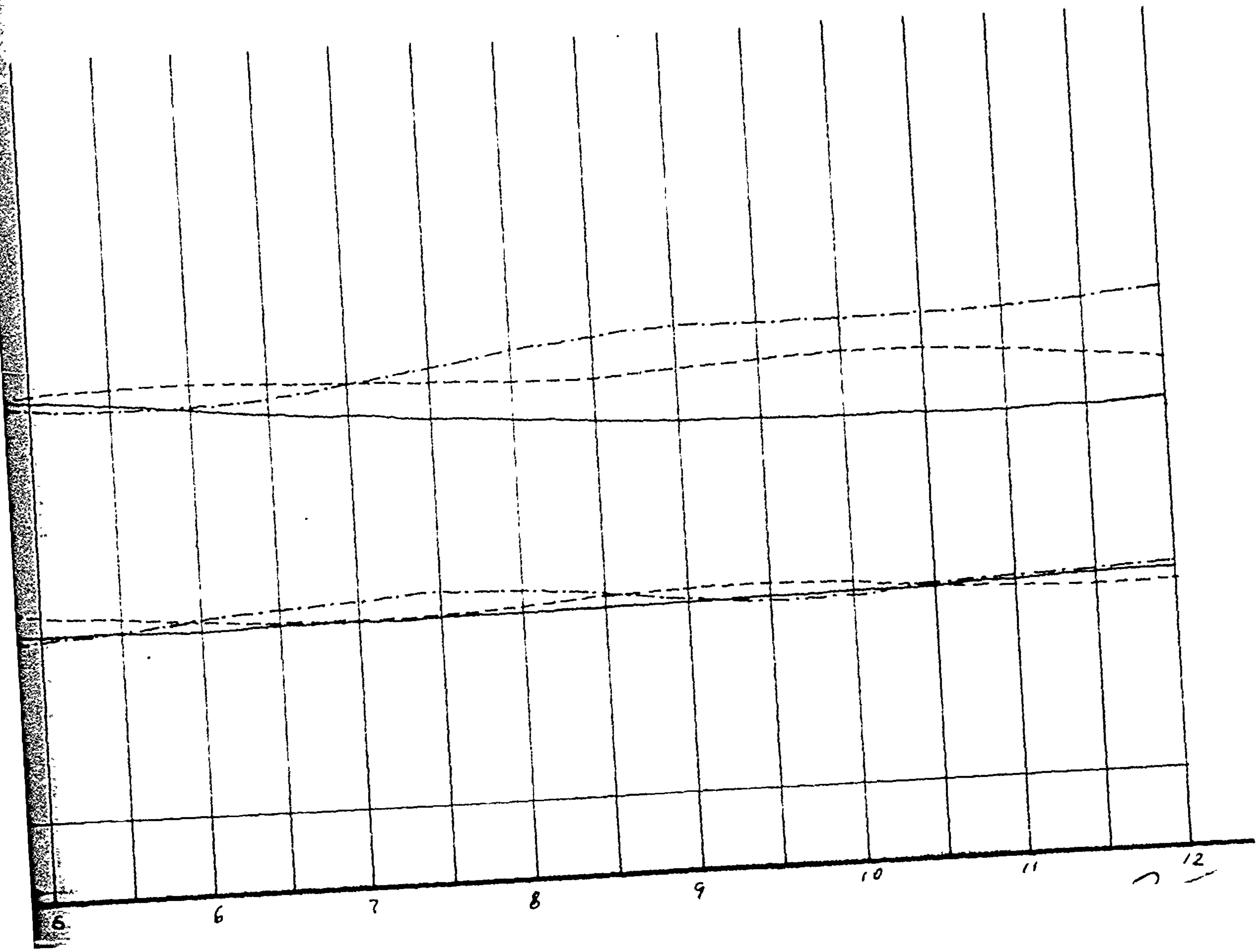


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FIGURE NO. 101

RIGHT DIRECTIONAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION : CLEAN
FULL PEDAL TRAVEL : 4.50 INCHES
AVERAGE GROSS WEIGHT : 2640 LBS
LONG. C.G. LOCATION : 101.3 INCHES (AFT)
LATERAL C.G. LOCATION : 0.2 IN. (LT.)

FLIGHT CONDITION : LEVEL FLIGHT
TRIM CAS : 75 KNOTS
DENSITY ALTITUDE : 10200 FEET
ROTOR SPEED : 368 RPM
SAS CONDITION : ON

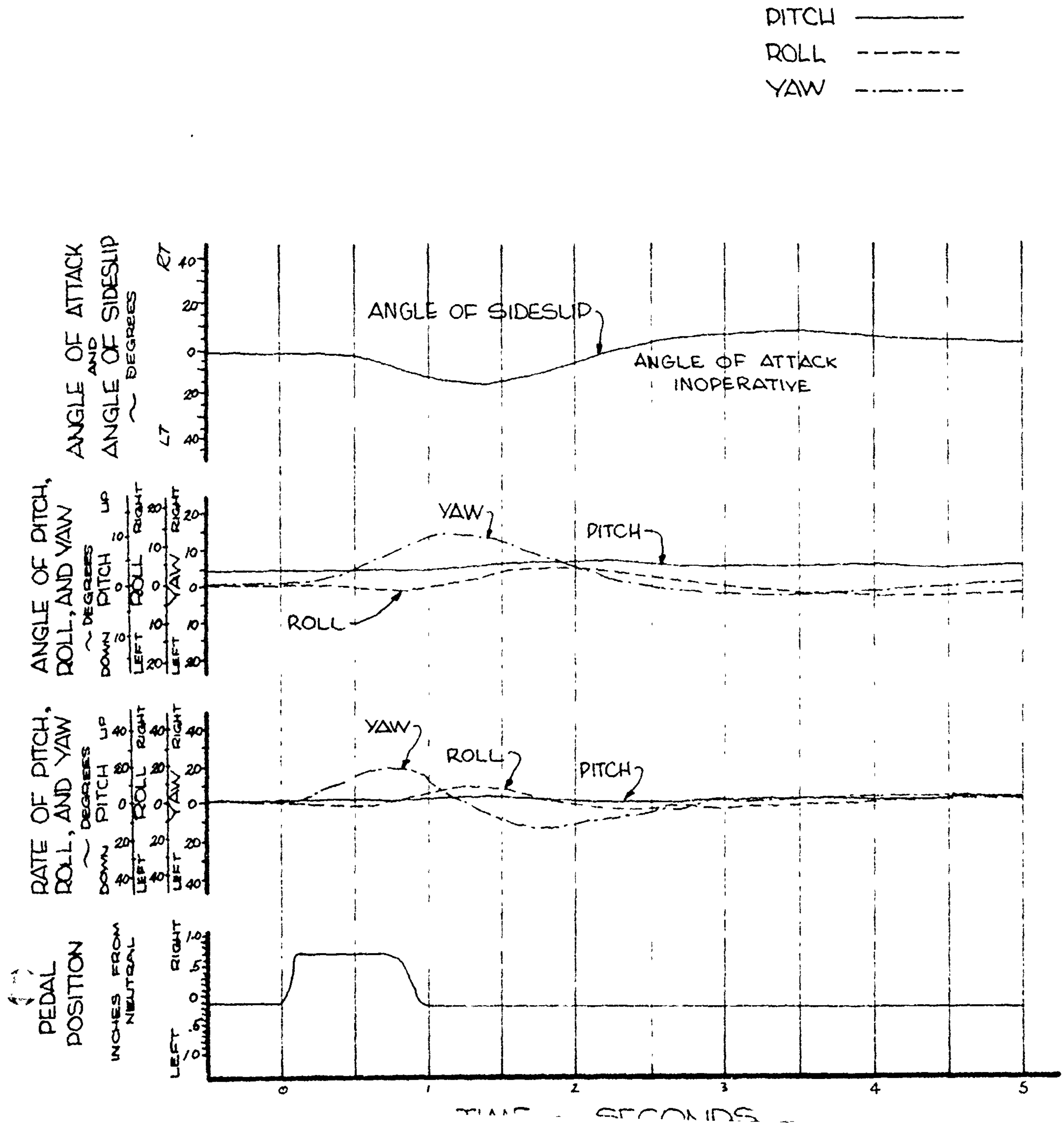


FIGURE NO. 102

RIGHT DIRECTIONAL PULSE

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION: XM-7	FLIGHT CONDITION: LEVEL FLIGHT
FULL PEDAL TRAVEL: 4.5 INCHES	TRIM CAS: 77 KNOTS
AVERAGE GROSS WEIGHT: 2630 LBS.	DENSITY ALTITUDE: 4800 FEET
LONG. C.G. LOCATION: 101.1 INCHES (AFT)	ROTOR SPEED: 368 RPM
LATERAL C.G. LOCATION: 1.1 IN. (LT.)	SAS CONDITION: ON

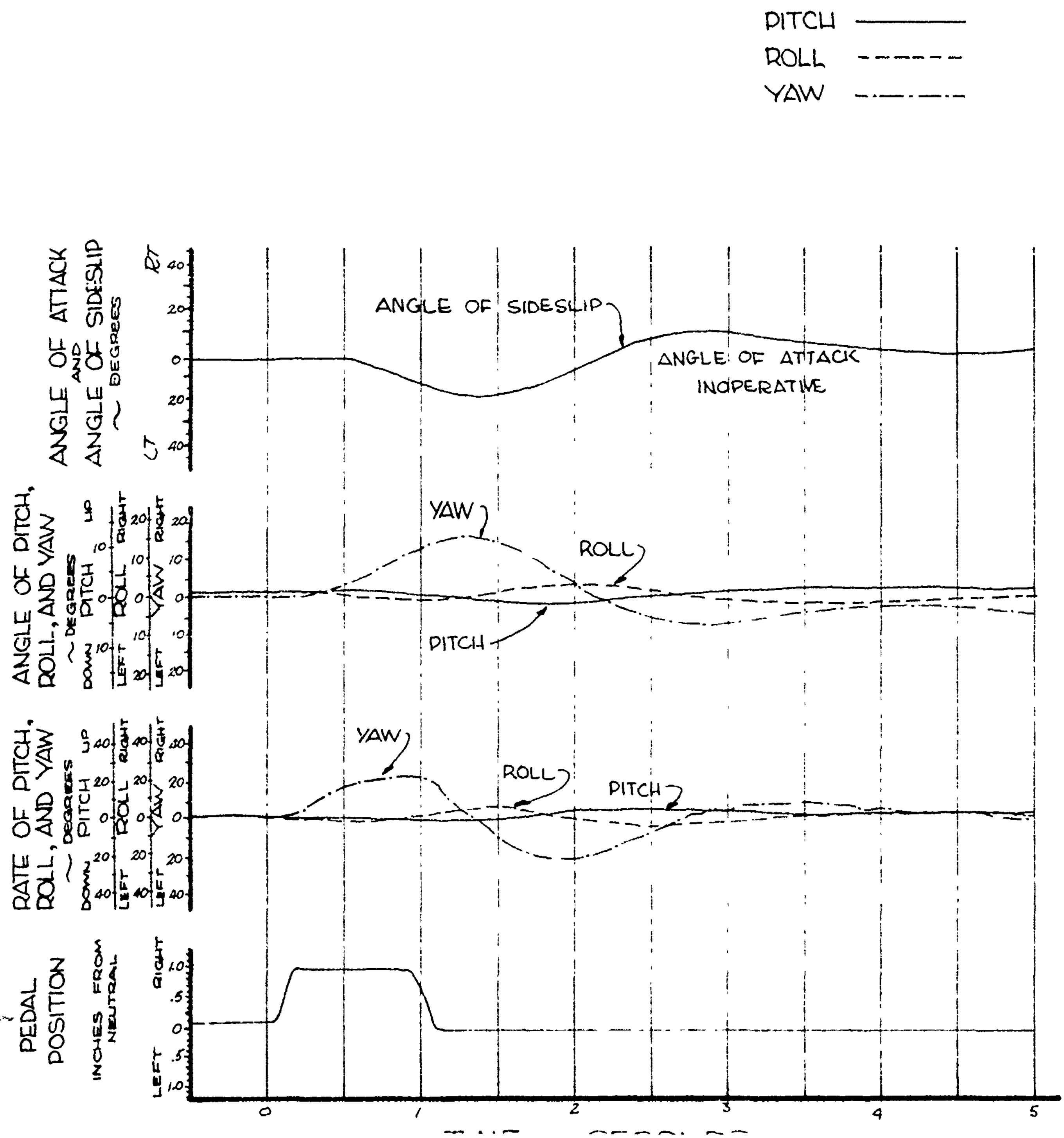


FIGURE NO. 103
RIGHT DIRECTIONAL PULSE
OH-5A, U.S.A., S/N 62-4210

CONFIGURATION : XM-8
FULL PEDAL TRAVEL: 4.5 INCHES
AVERAGE GROSS WEIGHT : 2650 LBS.
LONG. C.G. LOCATION : 101.1 INCHES (AFT)
LATERAL C.G. LOCATION : 0.2 IN. (RT.)

FLIGHT CONDITION : LEVEL FLIGHT
TRIM CAS : 77 KNOTS
DENSITY ALTITUDE : 4800 FEET
ROTOR SPEED : 368 RPM
SAS CONDITION: ON

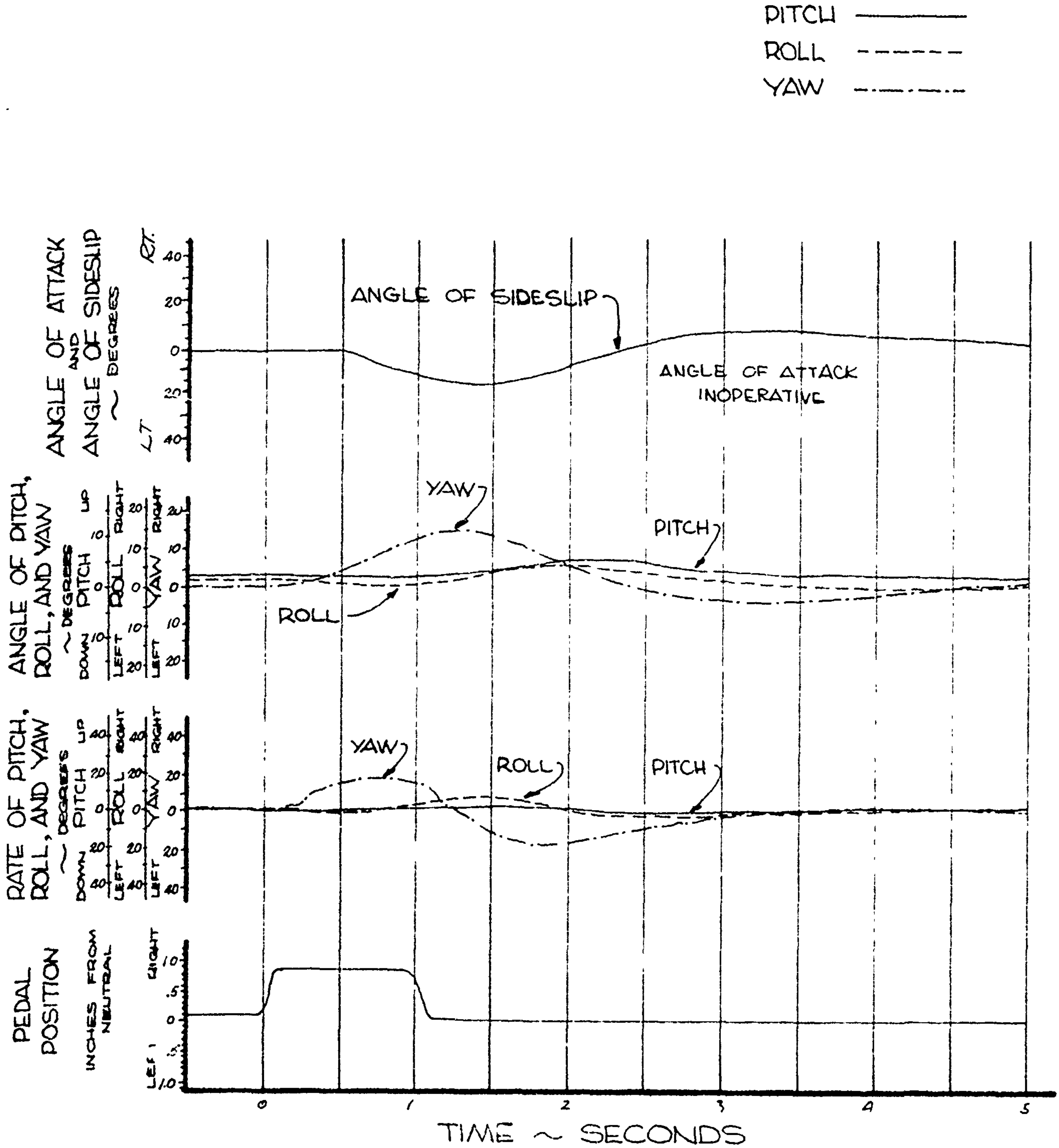


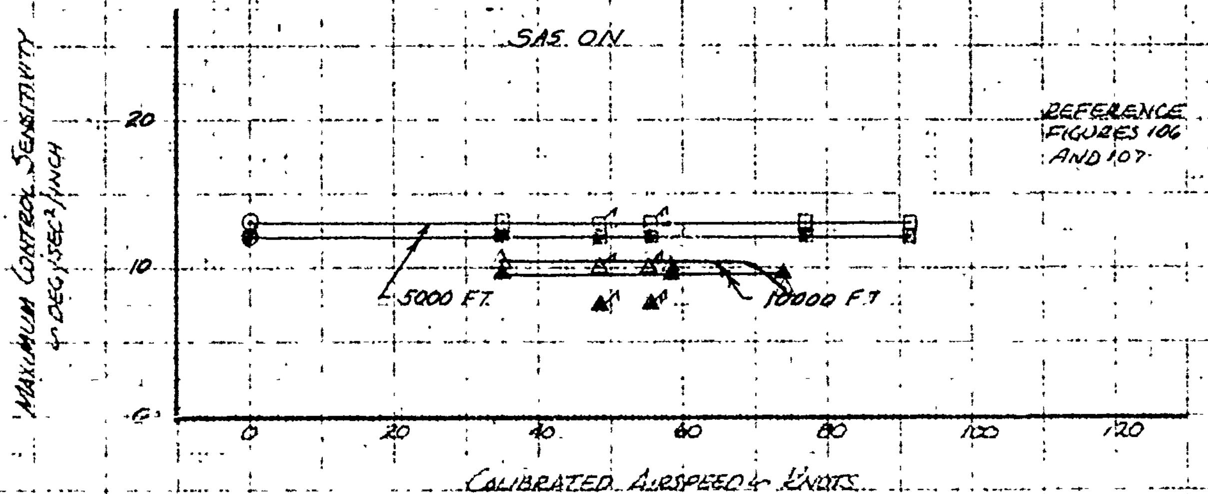
FIGURE No. 104

SUMMARY OF LONGITUDINAL CONTROL SENSITIVITY

OH-5A USA S/N 62-4209 & 10

SYM	AVG H_p ~FT	AVG G.W ~LB	AVG CG ~ IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT. COND
○	1600	2730	101.4 (AFT)	0.2 LT.	368	CLEAN	HOVER (IGE)
⊡	5300	2720	101.4 (AFT)	0.2 LT.	368	CLEAN	LEVEL & NOTED
△	10,000	2640	101.3 (AFT)	0.2 LT.	368	CLEAN	LEVEL & NOTED

NOTE:
1. SHADED SYMBOLS DENOTE PITCH DOWN
2. SINGLE FLAG ON SYMBOL DENOTE CLIMB
3. DOUBLE FLAG ON SYMBOL DENOTES AUTOROTATION
4. HALF SHADED SYMBOL DENOTES BOTH PITCH DOWN AND PITCH UP



SYM	AVG. H_p ~FT	AVG G.W. ~LB	AVG. C.G. ~ IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT. COND.
◇	1200	2710	95.5 (FWD)	0.2 LT.	368	CLEAN	HOVER (IGE)
⊖	5200	2700	95.4 (FWD)	0.2 LT.	368	CLEAN	LEVEL & NOTED
⊡	5200	2970	94.6 (FWD)	0.2 LT.	368	CLEAN	LEVEL & NOTED

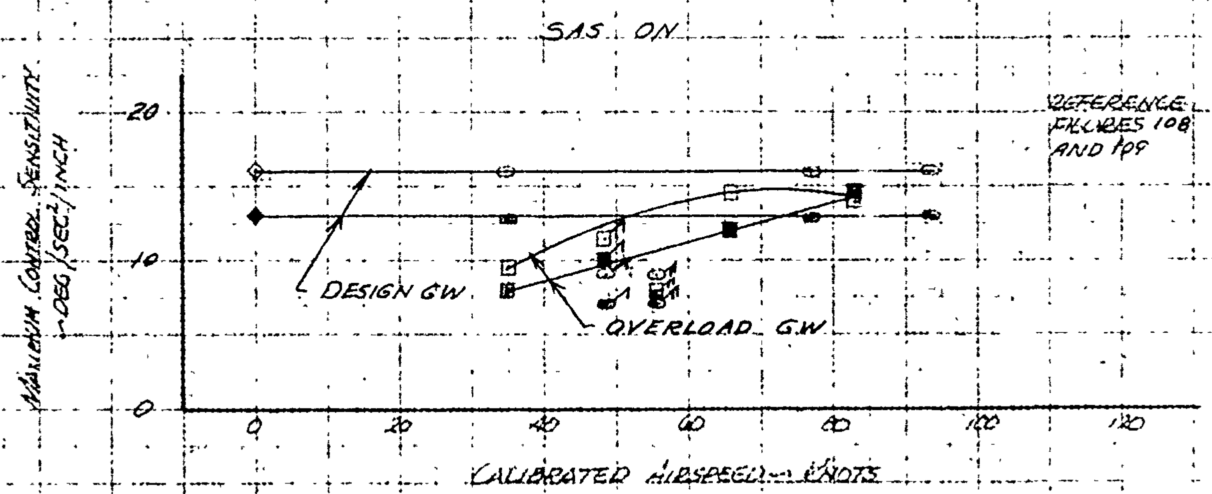


FIGURE NO. 105

SUMMARY OF LONGITUDINAL CONTROL SENSITIVITY

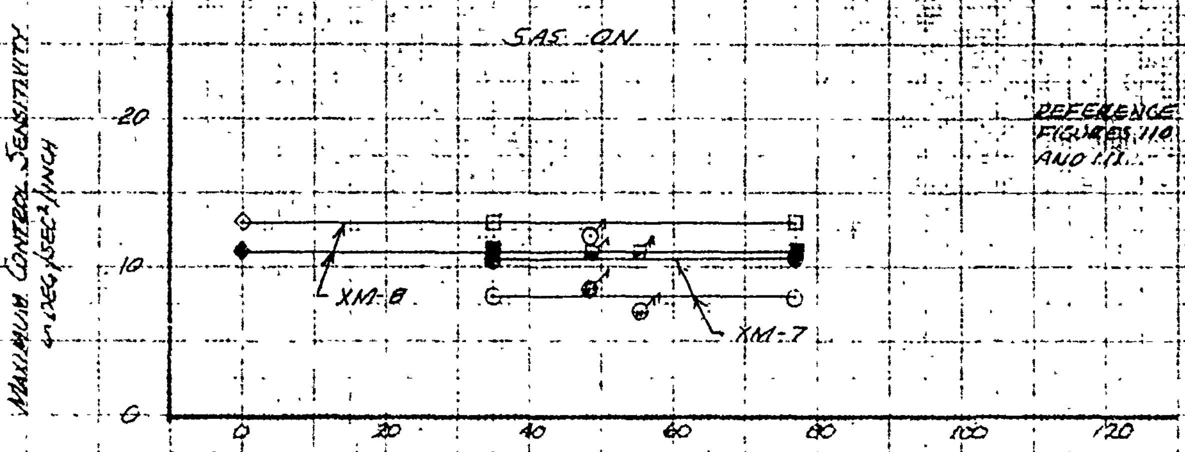
OH-5A USA S/N 62-4209 & 10

SYM	AVG H_D ~ FT	AVG G.W. ~ LB	AVG CG ~ IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT COND
⊙	4900	2700	101.2 (AFT)	1.1 LT.	368	XM-7	LEVEL & NOTED
◇	1600	2680	101.2 (AFT)	0.3 RT.	368	XM-8	HOVER (IGE)
⊡	4900	2720	101.2 (AFT)	0.3 RT.	368	XM-8	LEVEL & NOTED

NOTE

1. SHADED SYMBOLS DENOTE PITCH DOWN.
2. SINGLE FLAG ON SYMBOL DENOTES CLIMB
3. DOUBLE FLAG ON SYMBOL DENOTES AUTOROTATION
4. HALF SHADED SYMBOL DENOTES BOTH PITCH DOWN AND PITCH UP

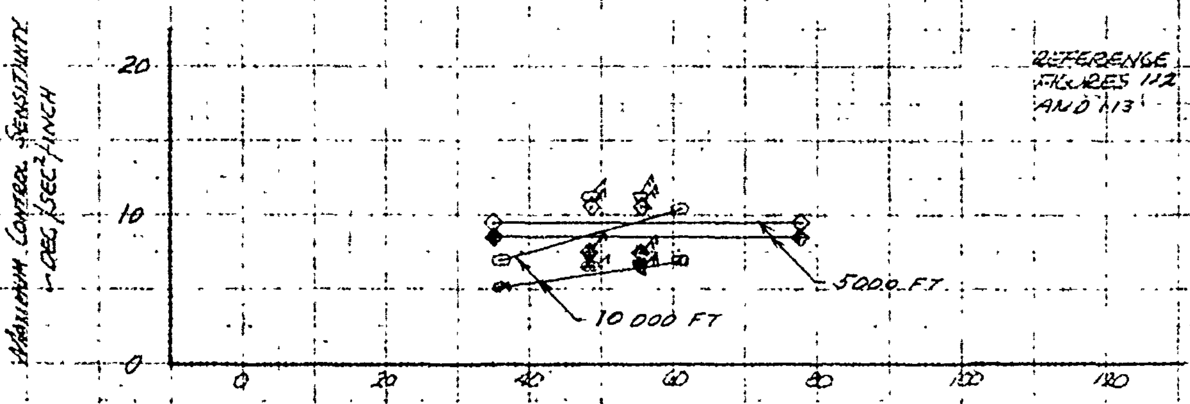
SAS ON



CALIBRATED AIRSPEED ~ KNOTS

SYM	AVG H_D ~ FT	AVG G.W. ~ LB	AVG C.G. ~ IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT COND
◇	5200	2700	101.4 (AFT)	0.2 LT.	368	CLEAN	LEVEL & NOTED
⊖	9900	2720	101.4 (AFT)	0.2 LT.	368	CLEAN	LEVEL & NOTED
◁	5000	2730	95.6 (AFT)	0.2 LT.	368	CLEAN	LEVEL & NOTED

SAS OFF



CALIBRATED AIRSPEED ~ KNOTS

FIGURE NO. 106

LONGITUDINAL CONTROL SENSITIVITY

OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG G.W. ~LB~	AVG C.G. ~IN~	AVG H_D ~FT~	CONFIGURATION & FLT CONDITION	
○	35	2730	101.4 (AFT)	5600	CLEAN	LEVEL
□	77	2710	101.3 (AFT)	5600	CLEAN	LEVEL
△	91.5	2680	101.3 (AFT)	5500	CLEAN	LEVEL
◇	0	2730	101.4 (AFT)	1600	CLEAN	HOVER (IGE)
⌂	48.5	2740	101.4 (AFT)	5000	CLEAN	CLIMB
▽	55.5	2730	101.4 (AFT)	5000	CLEAN	AUTO

368 ROTOR RPM

SAS ON

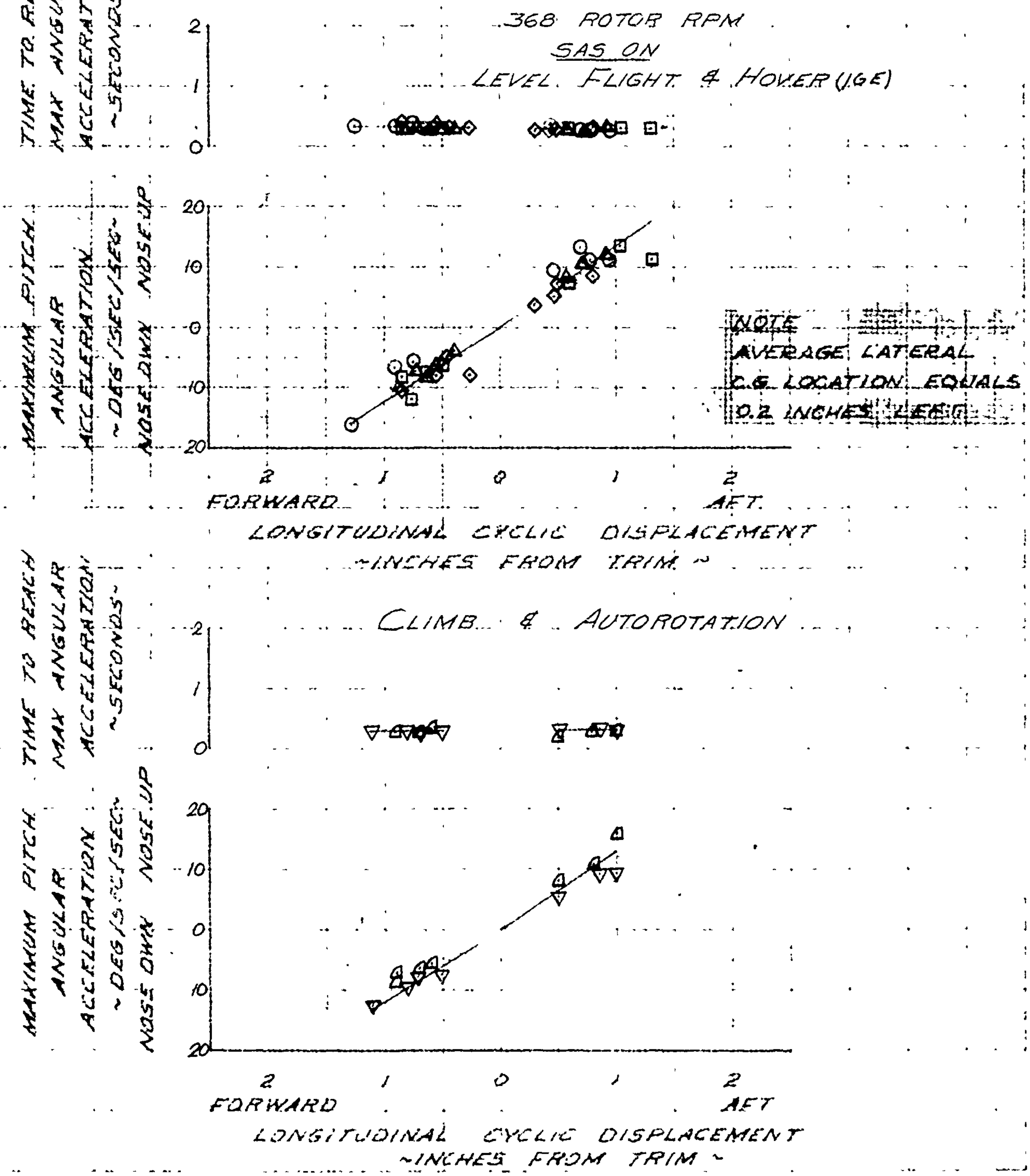


FIGURE No. 107

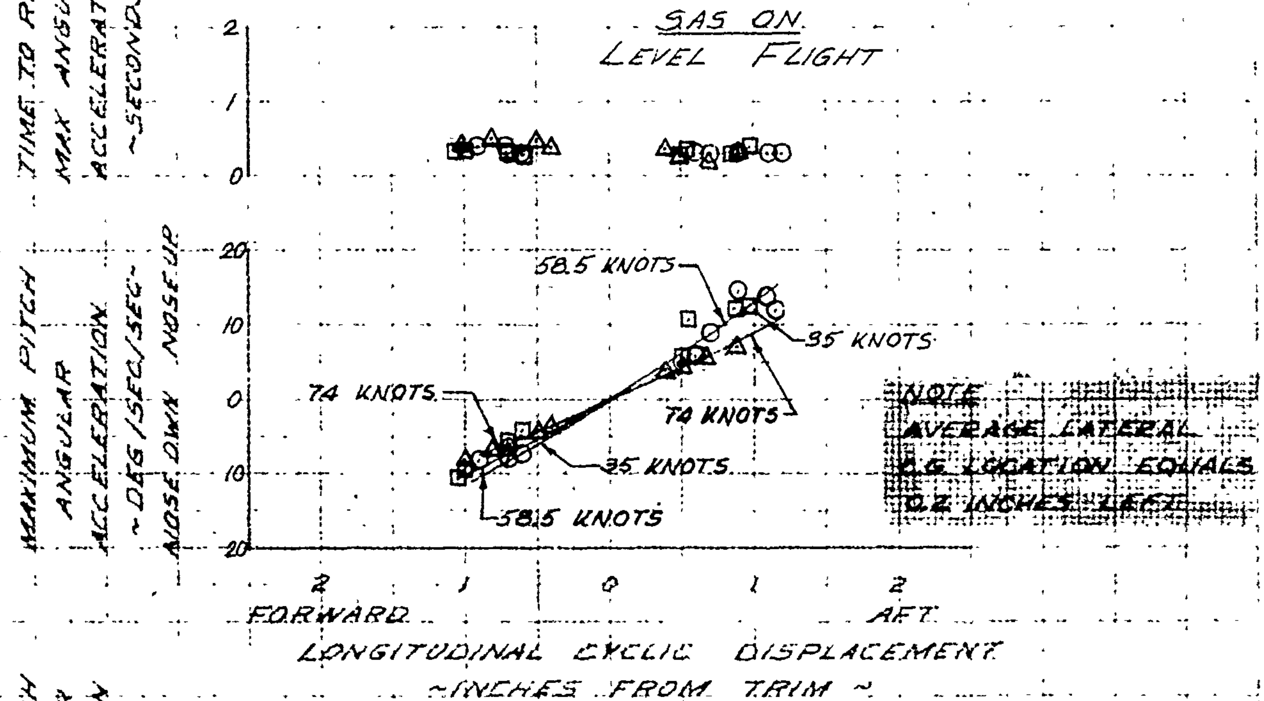
LONGITUDINAL CONTROL SENSITIVITY

OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG C.G. ~IN~	AVG H_0 ~FT~	CONFIGURATION & FLT CONDITION	
○	35	2710	101.4 (AFT)	10000	CLEAN	LEVEL
□	58.5	2680	101.3 (AFT)	9900	CLEAN	LEVEL
△	74	2670	101.3 (AFT)	10300	CLEAN	LEVEL
◻	48.5	2620	101.3 (AFT)	10000	CLEAN	CLIMB
▽	55.5	2610	101.3 (AFT)	10000	CLEAN	AUTO.

368 ROTOR RPM

SAS ON.



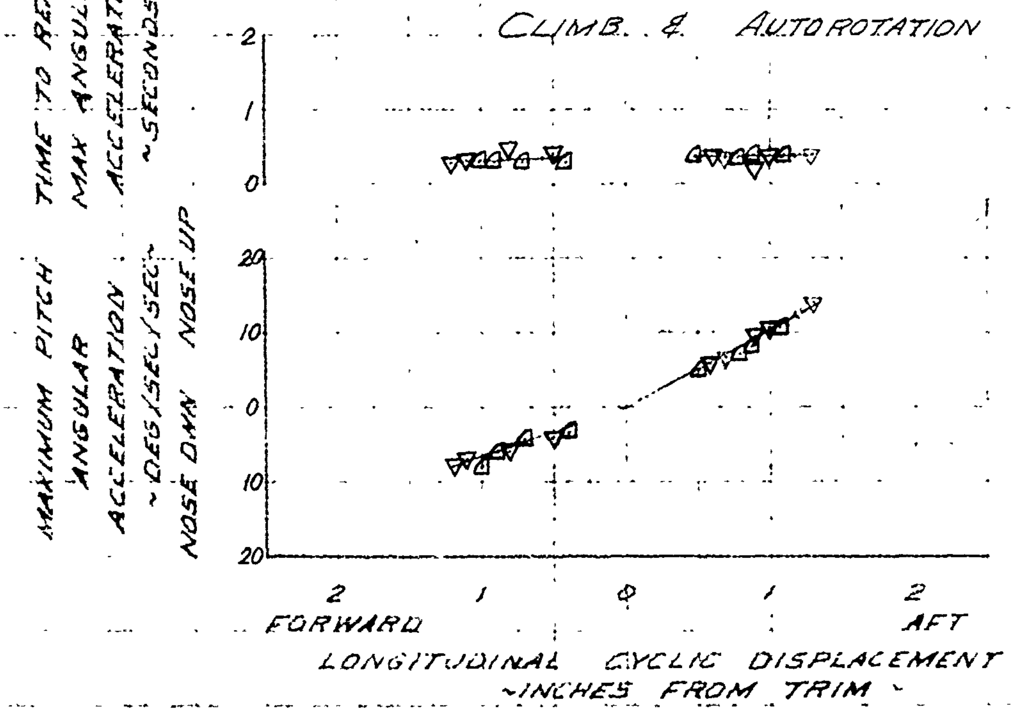
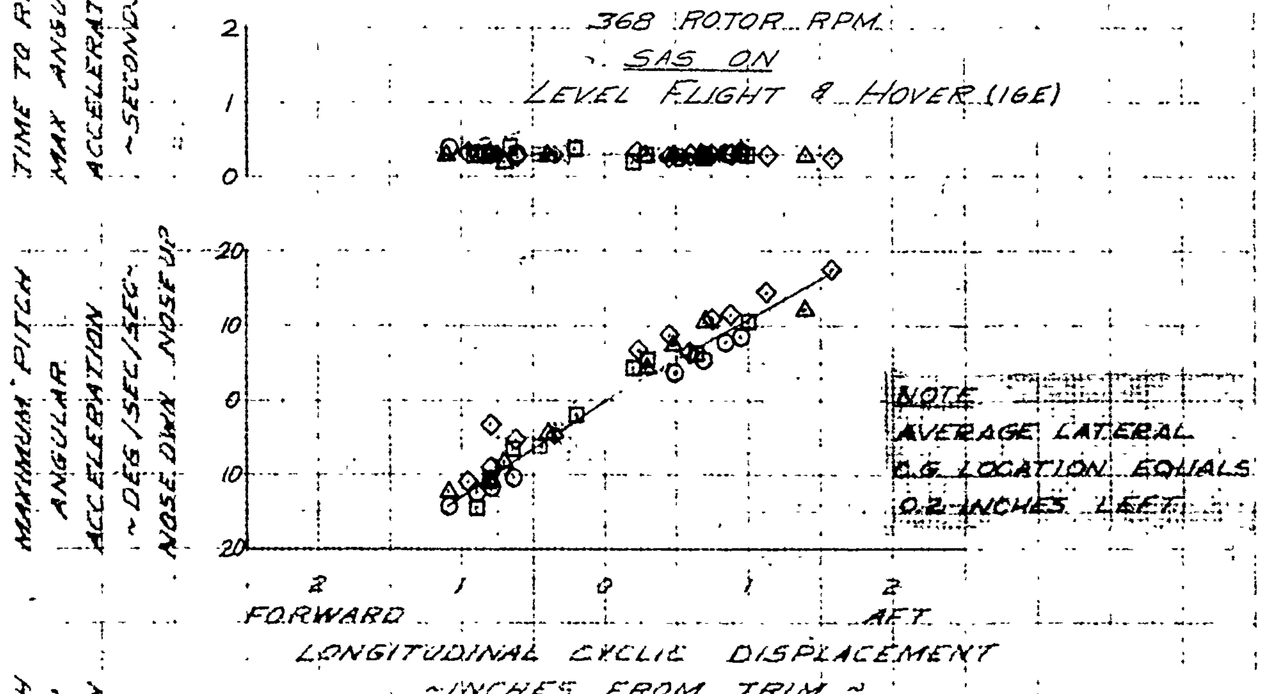


FIGURE NO. 108

LONGITUDINAL CONTROL SENSITIVITY

OH-5A USA S/N 62-4210 (62-4209 HOVER)

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG C.G. ~IN~	AVG H_D ~FT~	CONFIGURATION & FLT CONDITION	
○	35	2700	95.4 (FWD)	5800	CLEAN	LEVEL
□	77	2650	95.4 (FWD)	5600	CLEAN	LEVEL
△	93.5	2690	95.4 (FWD)	4800	CLEAN	LEVEL
◇	0	2710	95.5 (FWD)	1200	CLEAN	HOVER (IGE)
△	48.5	2730	95.5 (FWD)	5000	CLEAN	CLIMB
▽	55.5	2710	95.4 (FWD)	5000	CLEAN	AUTO



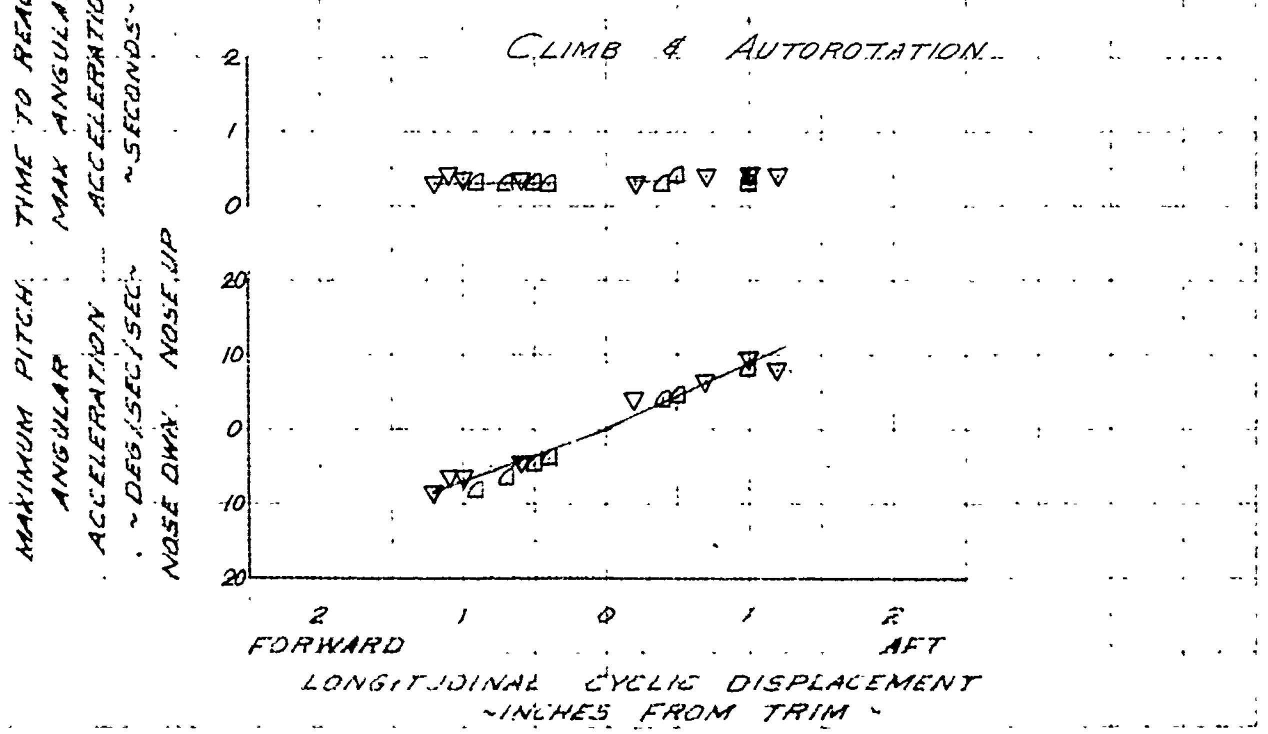


FIGURE No. 109

LONGITUDINAL CONTROL SENSITIVITY

OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG GW ~LB.~	AVG C.G. ~IN~	AVG H_D ~FT~	CONFIGURATION & FLT CONDITION	
○	35	3000	95.6 (FWD)	5800	CLEAN	LEVEL
□	66	2970	95.6 (FWD)	5100	CLEAN	LEVEL
△	83	2940	95.6 (FWD)	5100	CLEAN	LEVEL
◿	48.5	3010	95.7 (FWD)	5000	CLEAN	CLIMB
▽	55.5	2970	95.6 (FWD)	5000	CLEAN	AUTO

368 ROTOR RPM

SAS ON

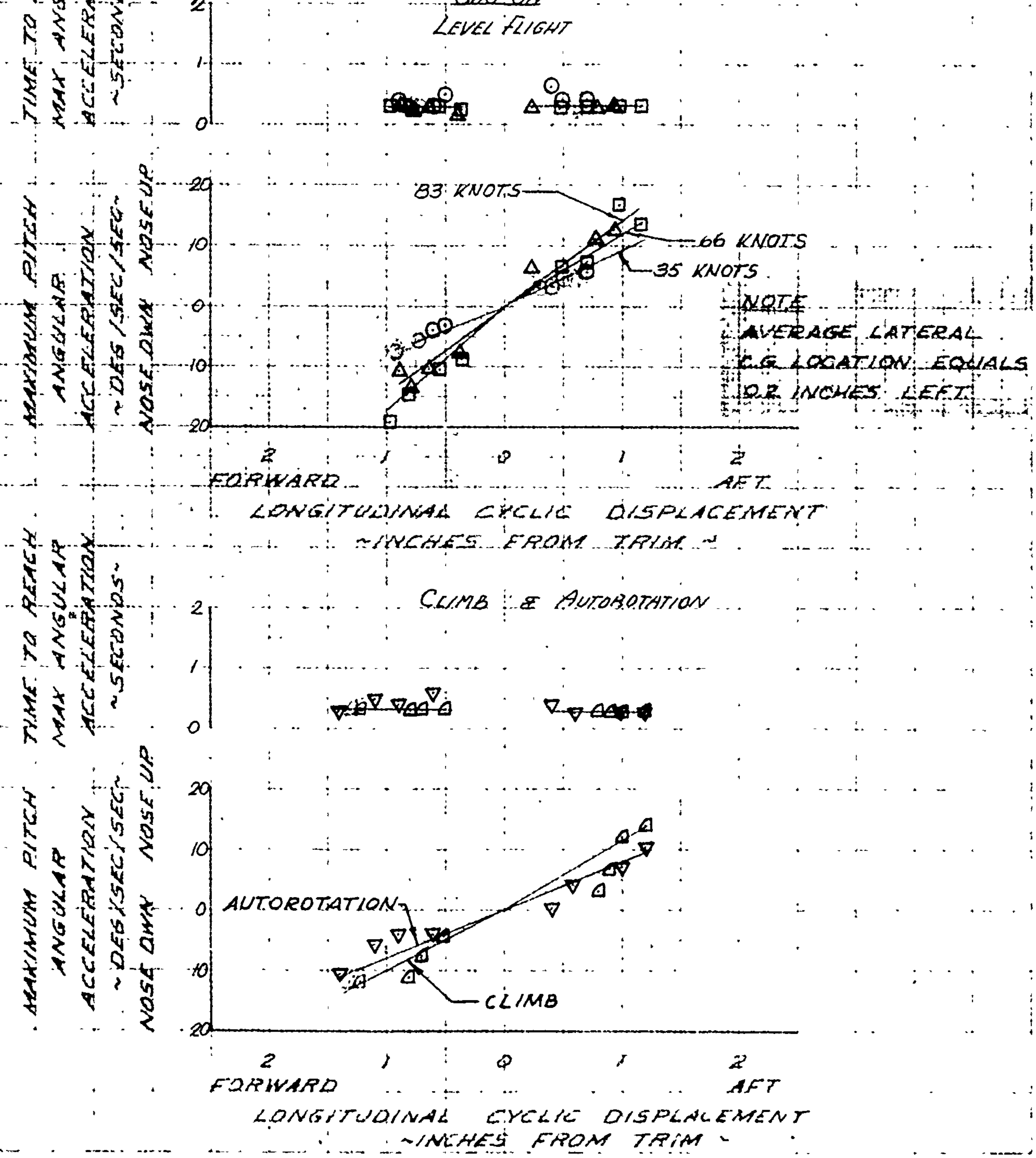


FIGURE No. 110

LONGITUDINAL CONTROL SENSITIVITY

OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG C.G. ~IN~	AVG H_p ~FT~	CONFIGURATION & FLT CONDITION	
○	35	2730	101.2(AFT)	4700	XM-7	LEVEL
□	77	2690	101.1(AFT)	4700	XM-7	LEVEL
△	48.5	2680	101.1(AFT)	5000	XM-7	CLIMB
▽	55.5	2610	101.1(AFT)	5000	XM-7	AUTO

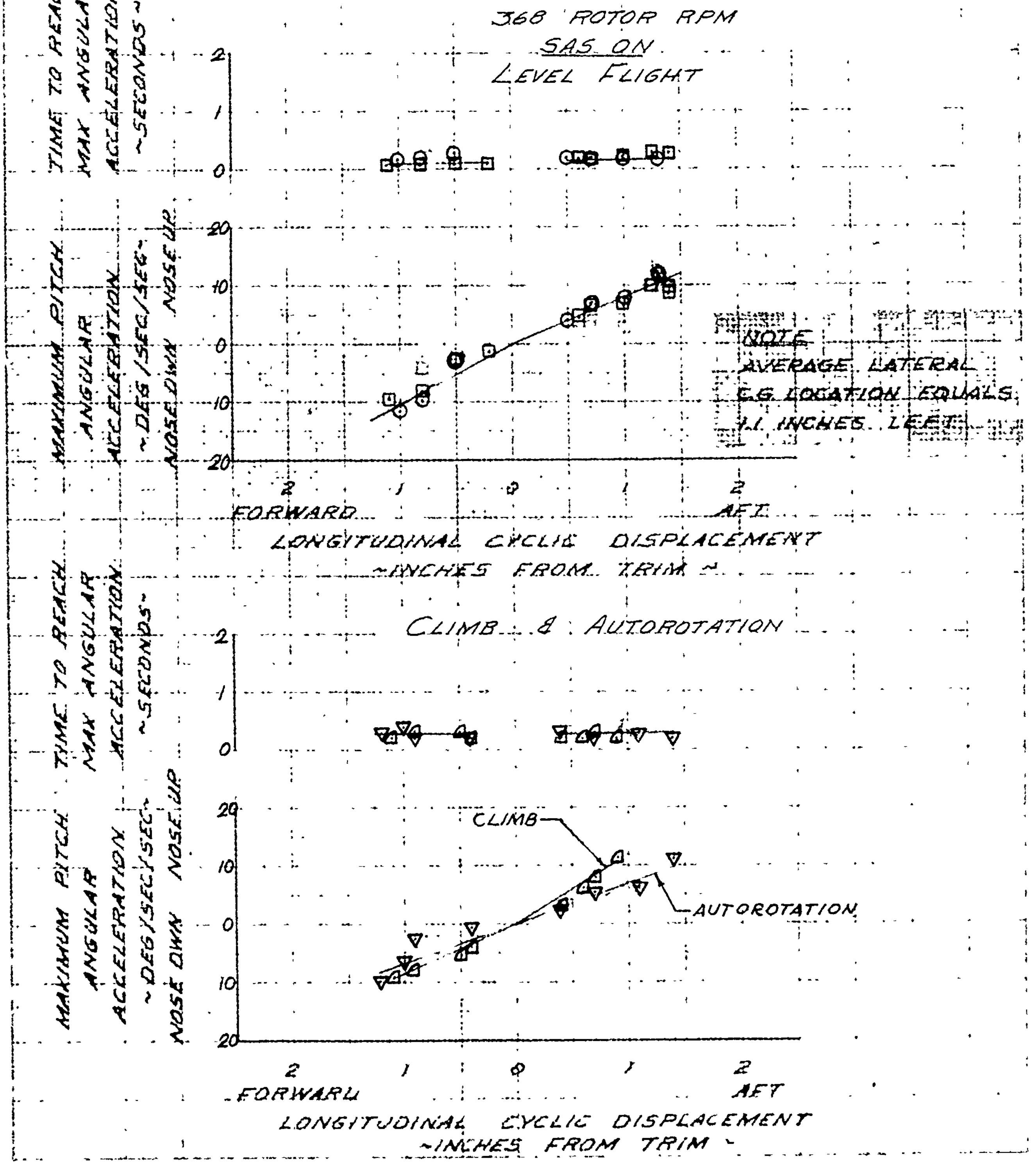


FIGURE NO. 111

LONGITUDINAL CONTROL SENSITIVITY

OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG C.G. ~IN~	AVG H_D ~FT~	CONFIGURATION & FLT CONDITION	
○	35	2720	101.2 (AFT)	4800	XM-8	LEVEL
⊡	77	2680	101.2 (AFT)	4800	XM-8	LEVEL
◇	0	2680	101.2 (AFT)	1600	XM-8	HOVER (IGE)
△	48.5	2740	101.2 (AFT)	5000	XM-8	CLIMB
▽	55.5	2730	101.2 (AFT)	5000	XM-8	AUTO.

368 ROTOR RPM

SAS ON

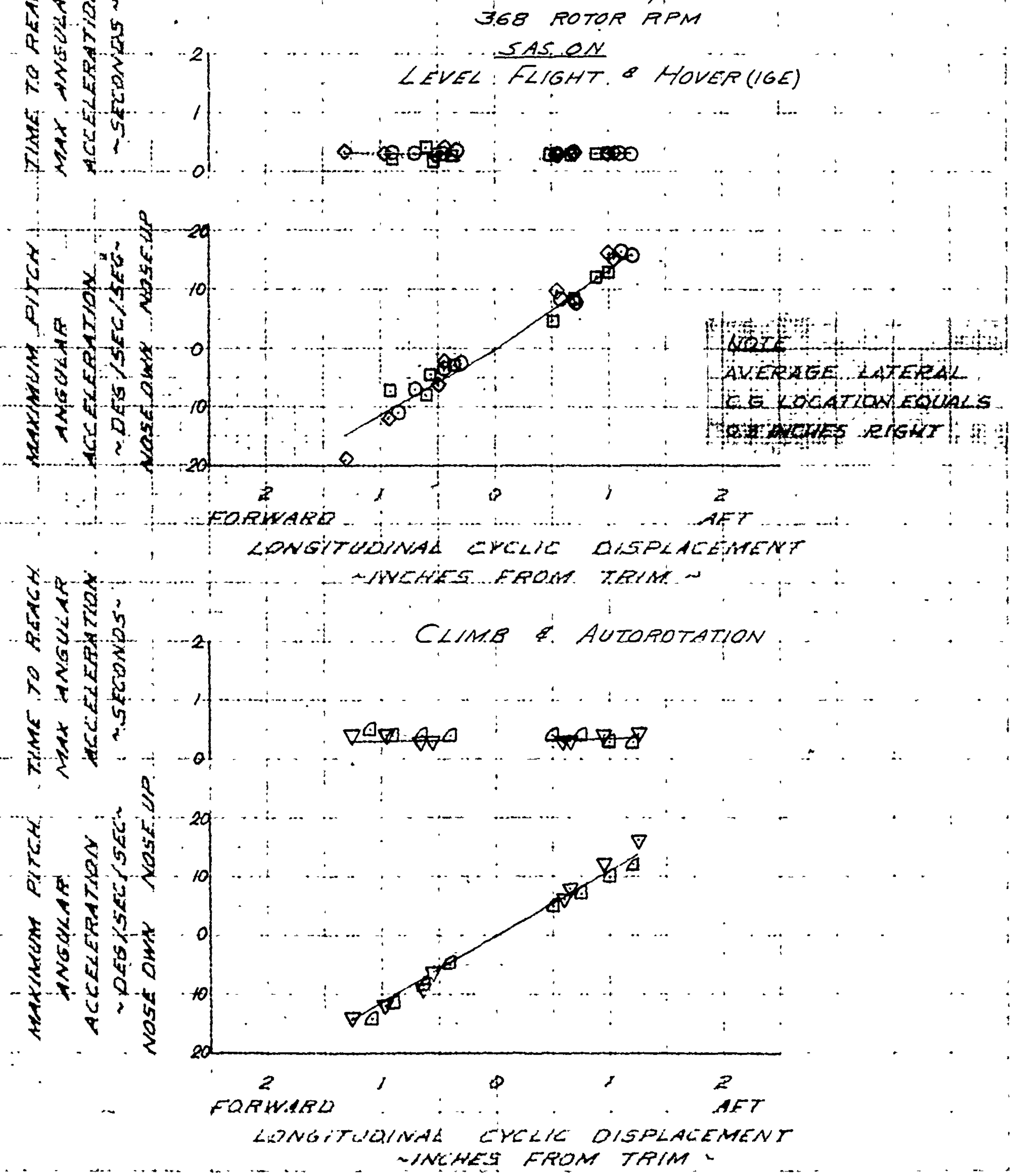


FIGURE No. 112.

LONGITUDINAL CONTROL SENSITIVITY
OH-5A USA S/N 62-4209

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG C.G. ~IN~	AVG H_D ~FT~	CONFIGURATION & FLT CONDITION	
○	35	2650	101.4 (AFT)	5000	CLEAN	LEVEL
□	77.5	2720	101.4 (AFT)	5900	CLEAN	LEVEL
[illegible]	49	2730	101.4 (AFT)	5000	CLEAN	CLIMB
▽	55.5	2720	101.4 (AFT)	5000	CLEAN	AUTO

368 ROTOR RPM
SAS OFF

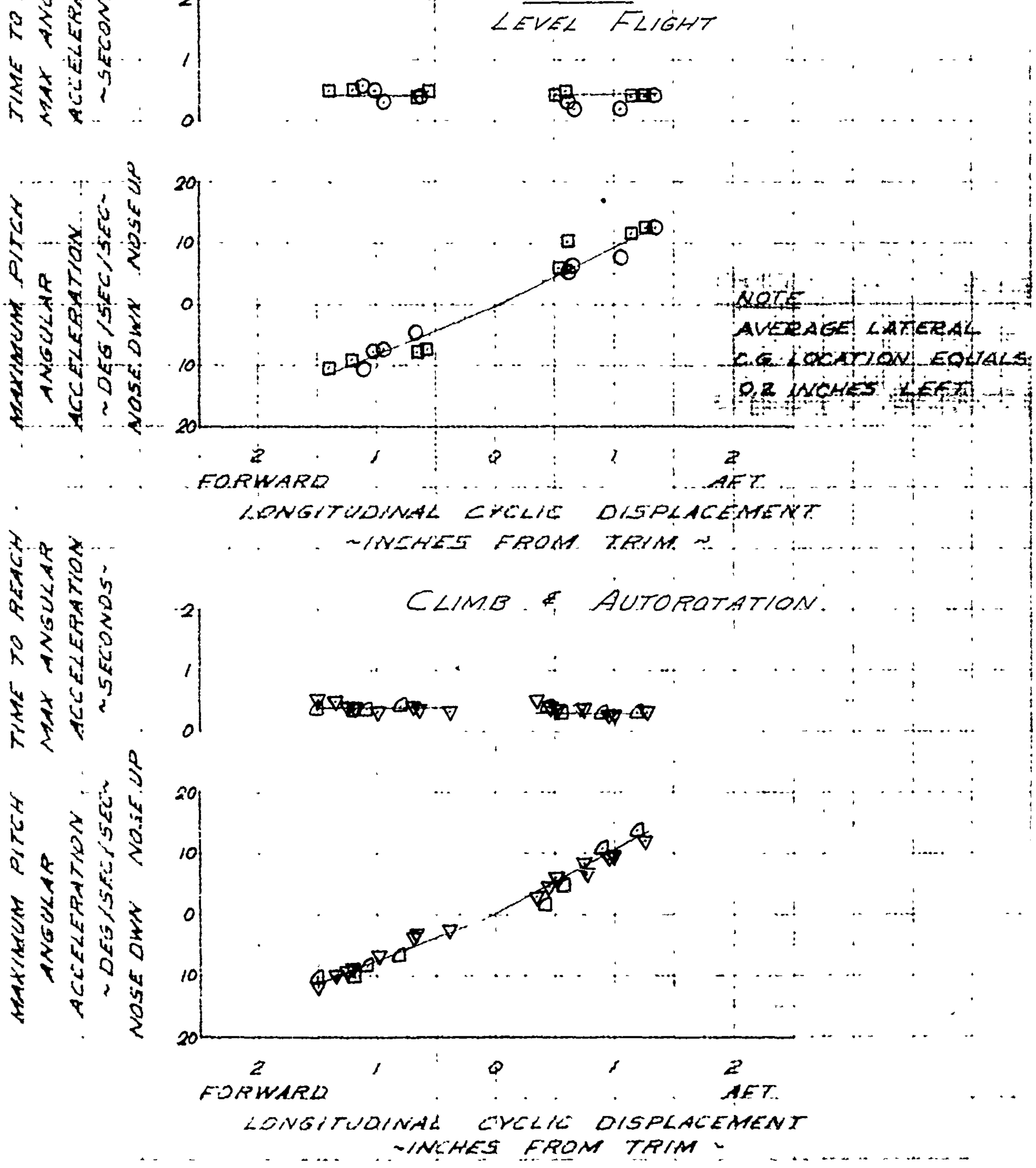


FIGURE No. 113

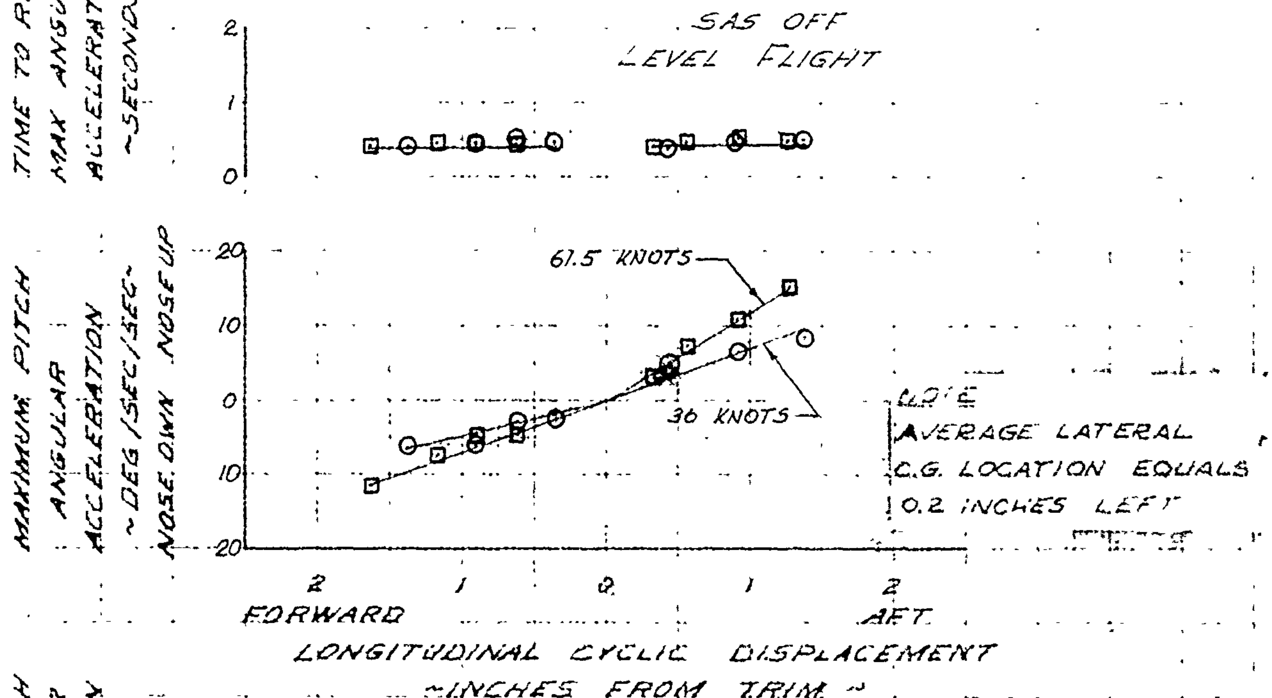
LONGITUDINAL CONTROL SENSITIVITY

OH-5A USA S/N 62-4209

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG C.G. ~IN~	AVG H_D ~FT~	CONFIGURATION & FLT CONDITION	
○	36	2720	101.4 (AFT)	9800	CLEAN	LEVEL
□	61.5	2700	101.4 (AFT)	10000	CLEAN	LEVEL
△	48.5	2730	95.6 (FWD)	5000	CLEAN	CLIMB
▽	55.5	2720	95.6 (FWD)	5000	CLEAN	AUTO
⊖	47.5	2730	101.4 (AFT)	10000	CLEAN	CLIMB

368 ROTOR RPM

SAS OFF



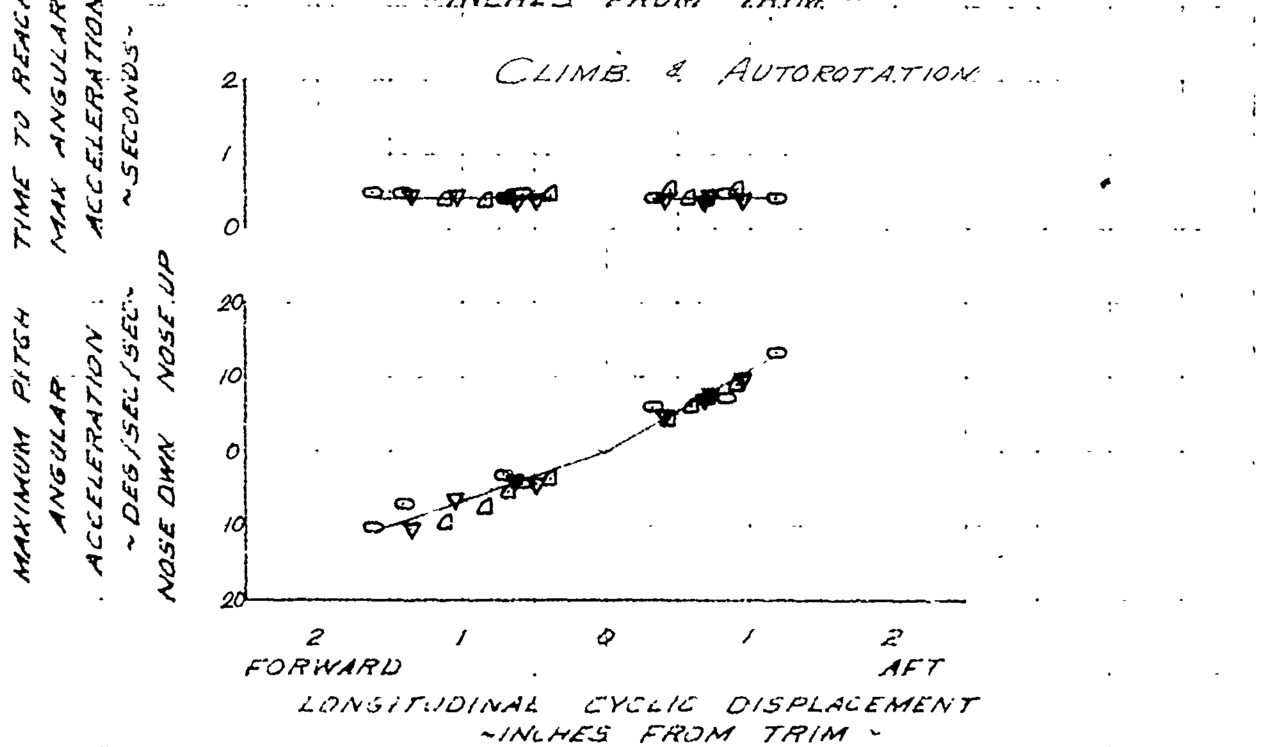


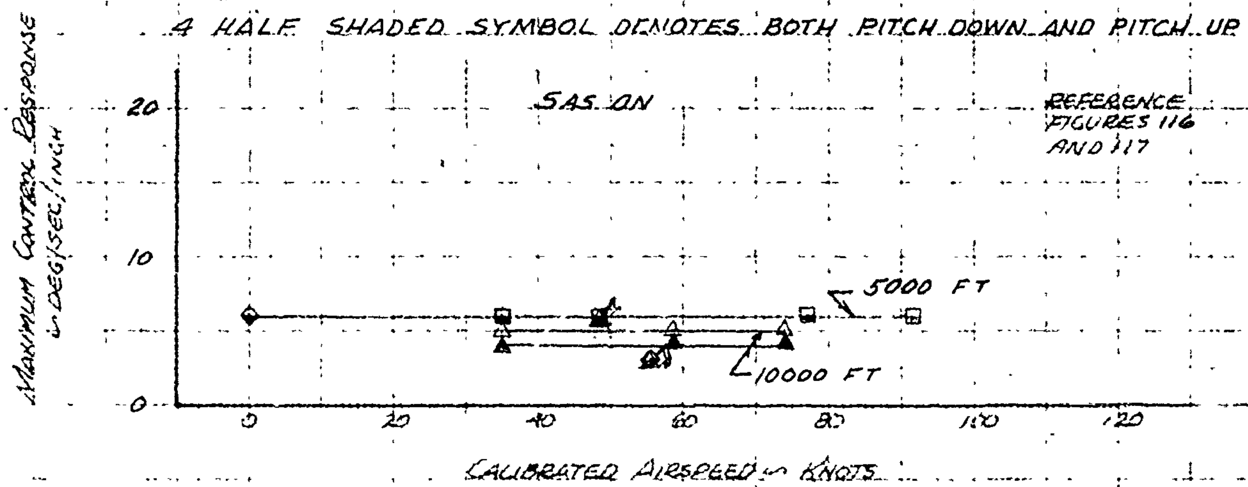
FIGURE NO. 114

SUMMARY OF LONGITUDINAL CONTROL RESPONSE

OH-5A USA S/N 62-4210

SYM	AVG H_p ~FT	AVG G.W. ~LB	AVG C.G. ~ IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT COND
○	1600	2730	101.4(AFT)	0.2 LT	368	CLEAN	HOVER (IGE)
□	5300	2720	101.4(AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED
△	10000	2640	101.3(AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED

NOTE
1 SHADED SYMBOLS DENOTE PITCH DOWN
2 SINGLE FLAG ON SYMBOL DENOTES CLIMB
3 DOUBLE FLAG ON SYMBOL DENOTES AUTOROTATION
4 HALF SHADED SYMBOL DENOTES BOTH PITCH DOWN AND PITCH UP



SYM	AVG H_p ~FT	AVG G.W. ~LB	AVG C.G. ~ IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT COND
◇	1200	2770	95.5(FWD)	0.2 LT	368	CLEAN	HOVER (IGE)
○	5200	2700	95.4(FWD)	0.2 LT	368	CLEAN	LEVEL & NOTED
□	5200	2970	95.6(FWD)	0.2 LT	368	CLEAN	LEVEL & NOTED

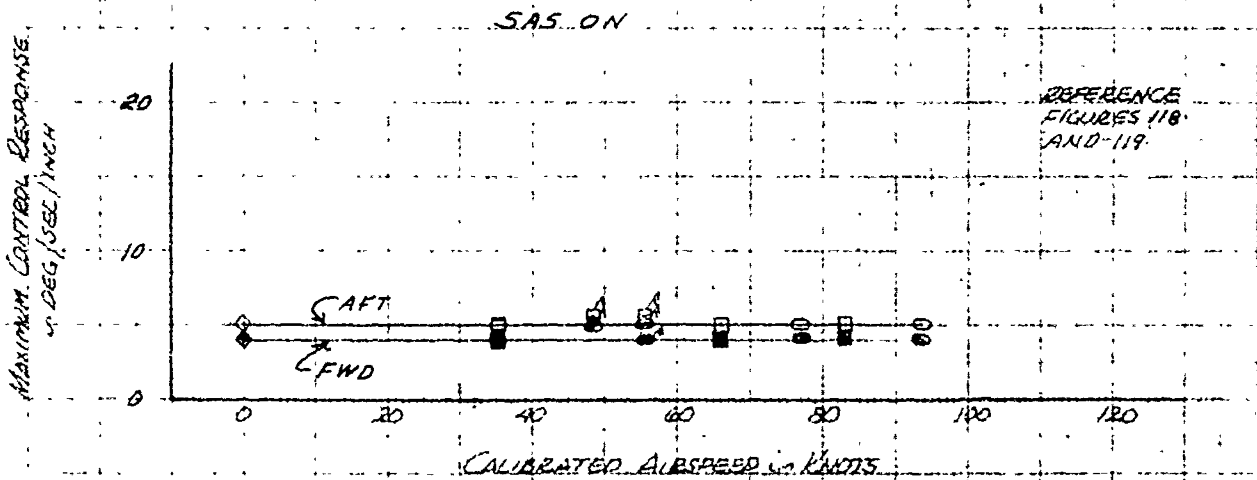


FIGURE No. 115

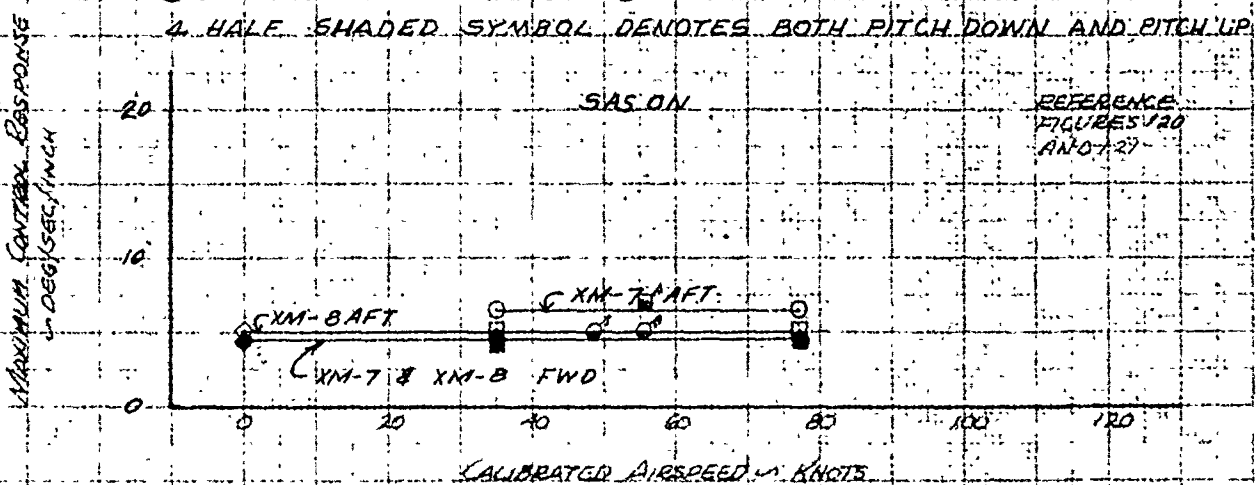
SUMMARY OF LONGITUDINAL CONTROL RESPONSE

OH-5A USA S/N 62-4210

SYM	AVG H_p ~FT	AVG G.W. ~LB	AVG C.G ~ IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT. COND
○	4900	2700	101.2(AFT)	1.1 LT	368	XM-7	LEVEL & NOTED
◇	1600	2680	101.2(AFT)	0.3 RT	368	XM-8	HOVER (IGE)
□	4900	2720	101.2(AFT)	0.3 RT	368	XM-8	LEVEL & NOTED

NOTE

1. SHADED SYMBOLS DENOTE PITCH DOWN.
2. SINGLE FLAG ON SYMBOL DENOTES CLIMB
3. DOUBLE FLAG ON SYMBOL DENOTES AUTOROTATION
4. HALF SHADED SYMBOL DENOTES BOTH PITCH DOWN AND PITCH UP



SYM	AVG H_p ~FT	AVG G.W. ~LB	AVG C.G ~ IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT. COND
◇	5200	2700	101.4(AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED
◇	9900	2720	101.4(AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED
◇	5000	2730	95.6(AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED

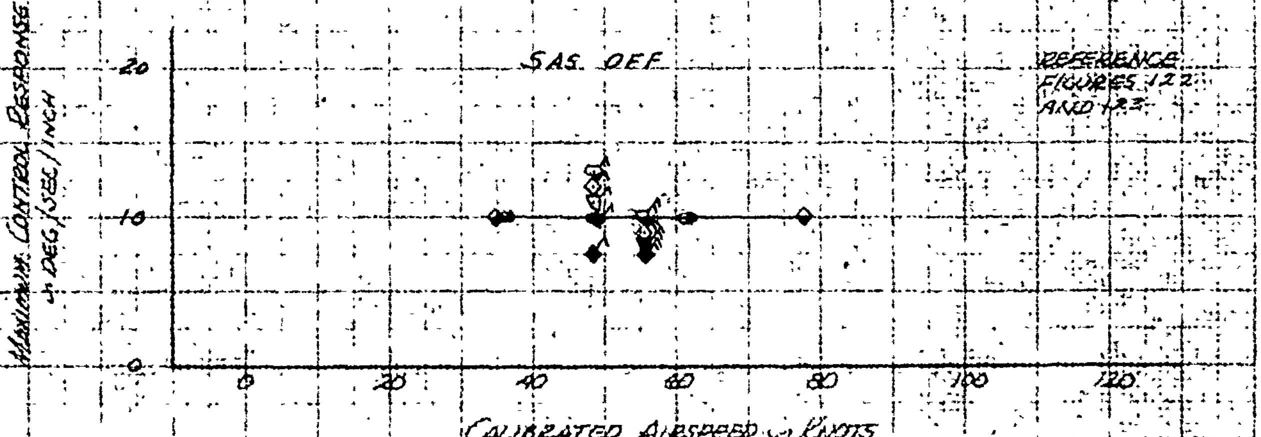


FIGURE No. 116

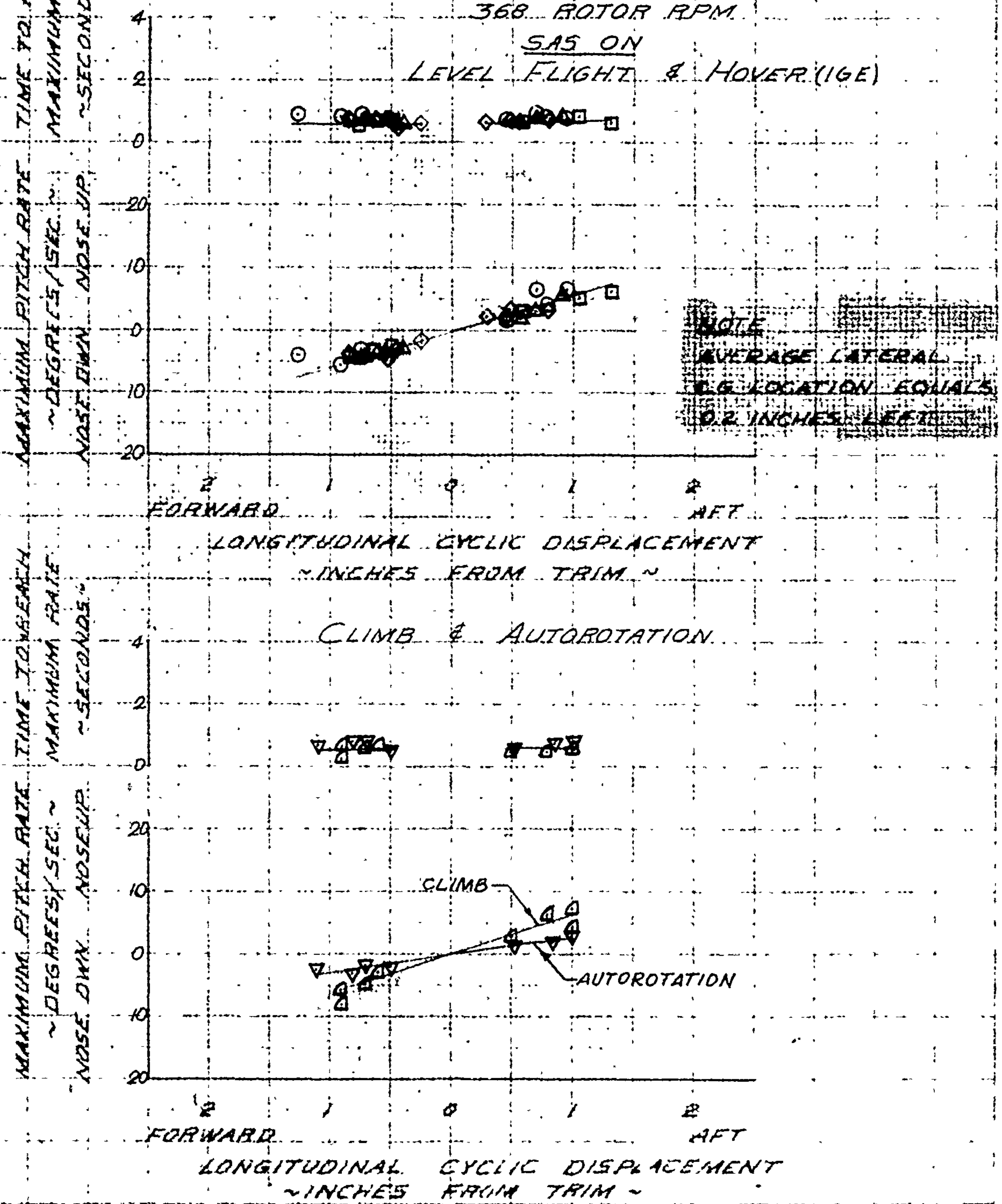
LONGITUDINAL CONTROL RESPONSE

OH-5A USA S/N 62-4210

SYM.	CAS ~KNOTS~	AVG. G.W. ~LB~	AVG C.G. ~IN~	AVG H_e ~FT~	CONFIGURATION & FLT CONDITION
○	35	2730	101.4 (AFT)	5600	CLEAN LEVEL
□	77	2710	101.3 (AFT)	5600	CLEAN LEVEL
△	91.5	2680	101.3 (AFT)	5500	CLEAN LEVEL
◇	0	2730	101.4 (AFT)	1600	CLEAN HOVER (IGE)
◺	48.5	2740	101.4 (AFT)	5000	CLEAN CLIMB
▽	55.5	2730	101.4 (AFT)	5000	CLEAN AUTO

368 ROTOR RPM

SAS ON



FOR OFFICIAL USE ONLY

FIGURE No. 117

LONGITUDINAL CONTROL RESPONSE

OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG G.W. ~LB~	AVG C.G. ~IN~	AVG H_p ~FT~	CONFIGURATION & FLT CONDITION	
○	35	2710	101.4 (AFT)	10000	CLEAN	LEVEL
□	58.5	2680	101.3 (AFT)	9900	CLEAN	LEVEL
△	74	2670	101.3 (AFT)	10300	CLEAN	LEVEL
⌂	48.5	2620	101.3 (AFT)	10000	CLEAN	CLIMB
▽	55.5	2610	101.3 (AFT)	10000	CLEAN	AUTO

368 ROTOR RPM

SAS ON

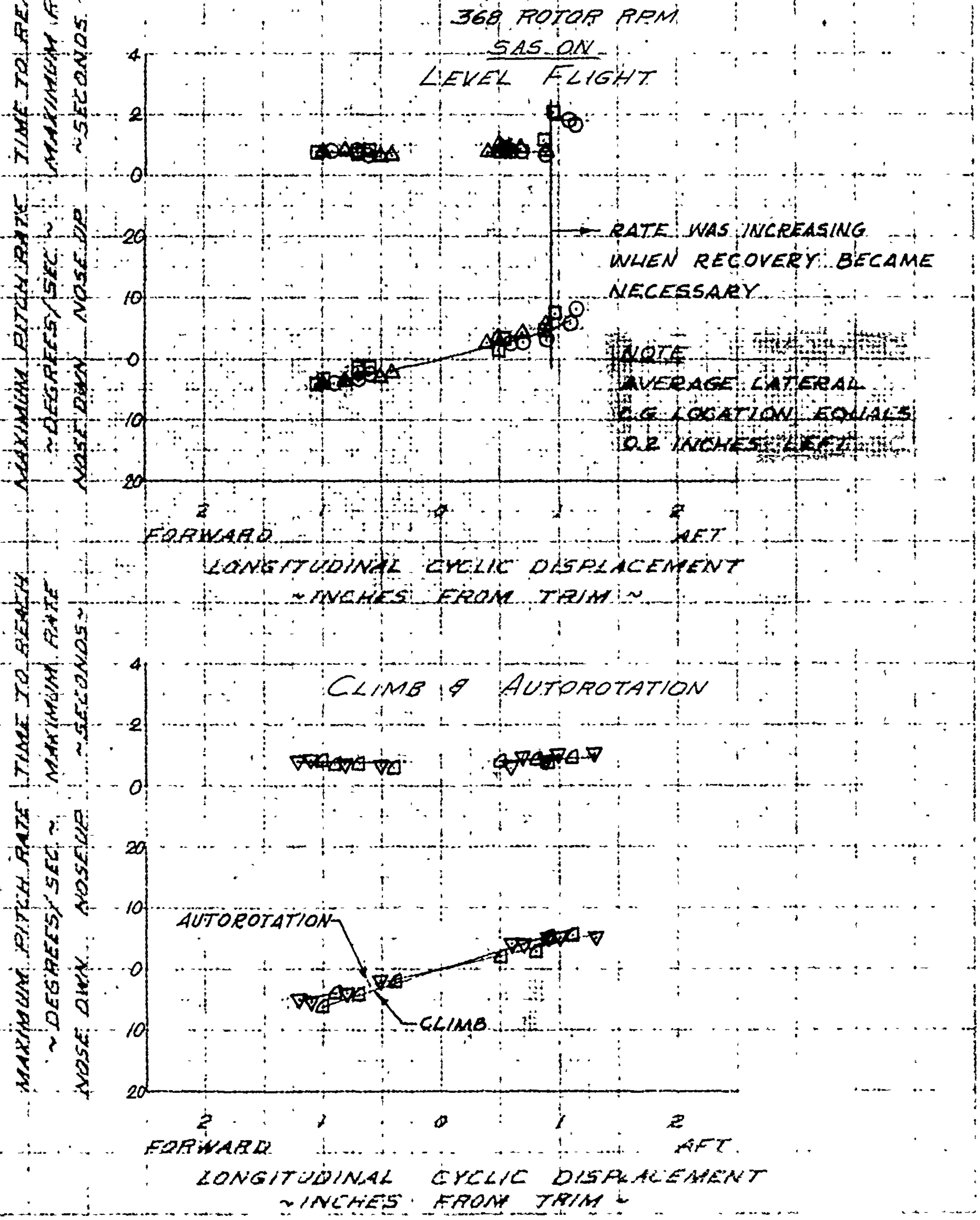


FIGURE No. 118

LONGITUDINAL CONTROL RESPONSE

OH-5A USA S/N 62-4210 (62-4209 HOVER)

SYM	CAS ~KNOTS~	AVG G.W. ~LB~	AVG CG ~IN~	AVG H_P ~FT~	CONFIGURATION & FLT CONDITION	
○	35	2700	95.4 (FWD)	5800	CLEAN	LEVEL
⊡	77	2650	95.4 (FWD)	5600	CLEAN	LEVEL
△	93.5	2690	95.4 (FWD)	4800	CLEAN	LEVEL
◇	0	2710	95.5 (FWD)	1200	CLEAN	HOVER (IGE)
⌂	48.5	2730	95.5 (FWD)	5000	CLEAN	CLIMB
▽	55.5	2710	95.4 (FWD)	5000	CLEAN	AUTO

368 ROTOR RPM

SAS ON

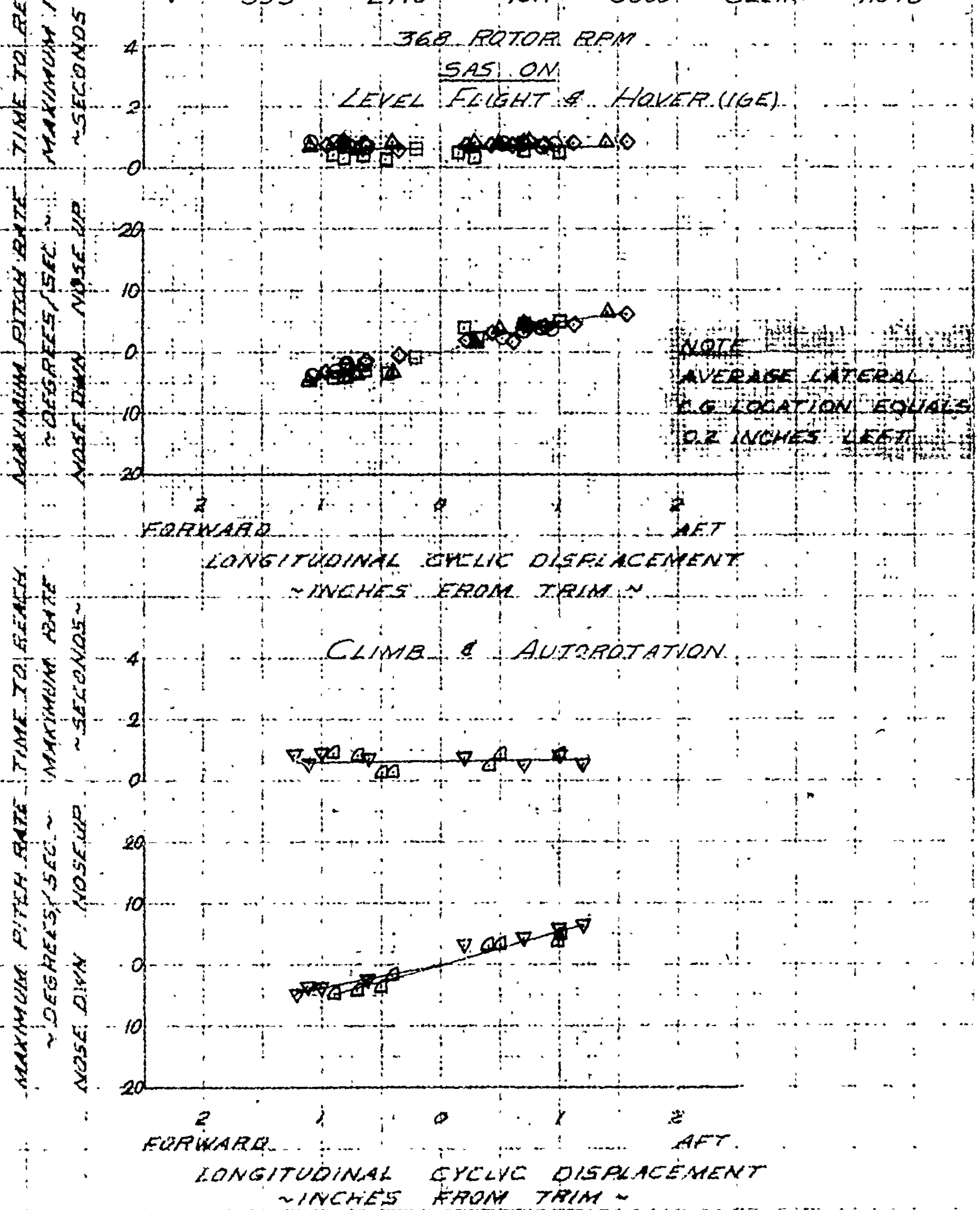


FIGURE No. 119

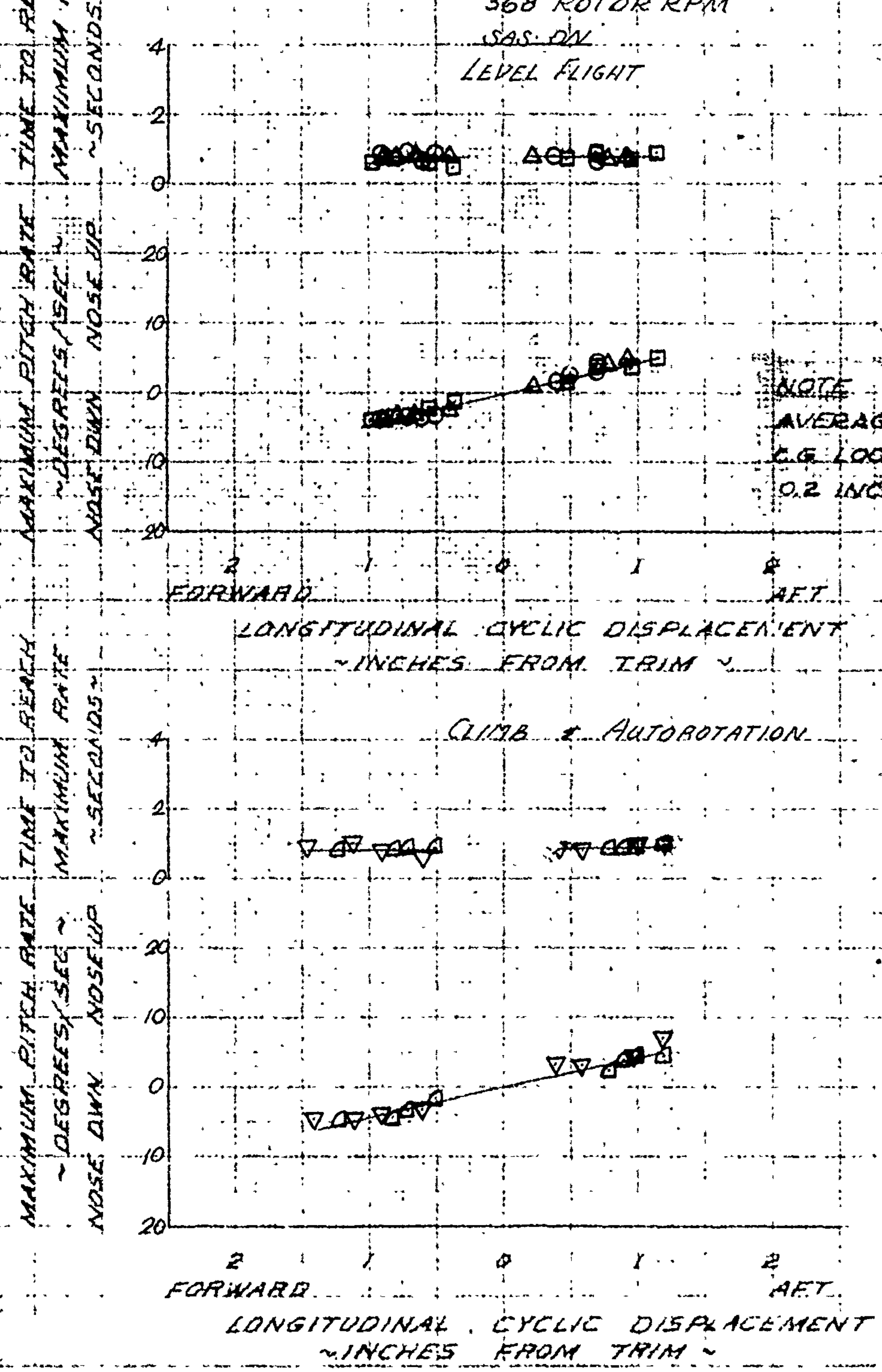
LONGITUDINAL CONTROL RESPONSE

OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS	AVG.G.W. ~LB~	AVG C.G. ~IN~	AVG H_p ~FT~	CONFIGURATION & FLT CONDITION	
○	35	3000	95.6 (FWD)	5800	CLEAN	LEVEL
⊡	66	2970	95.6 (FWD)	5700	CLEAN	LEVEL
△	83	2990	95.6 (FWD)	5100	CLEAN	LEVEL
◁	48.6	3010	95.7 (FWD)	5000	CLEAN	CLIMB
▽	55.5	2970	95.6 (FWD)	5000	CLEAN	AUTO

368 ROTOR RPM

SAS ON



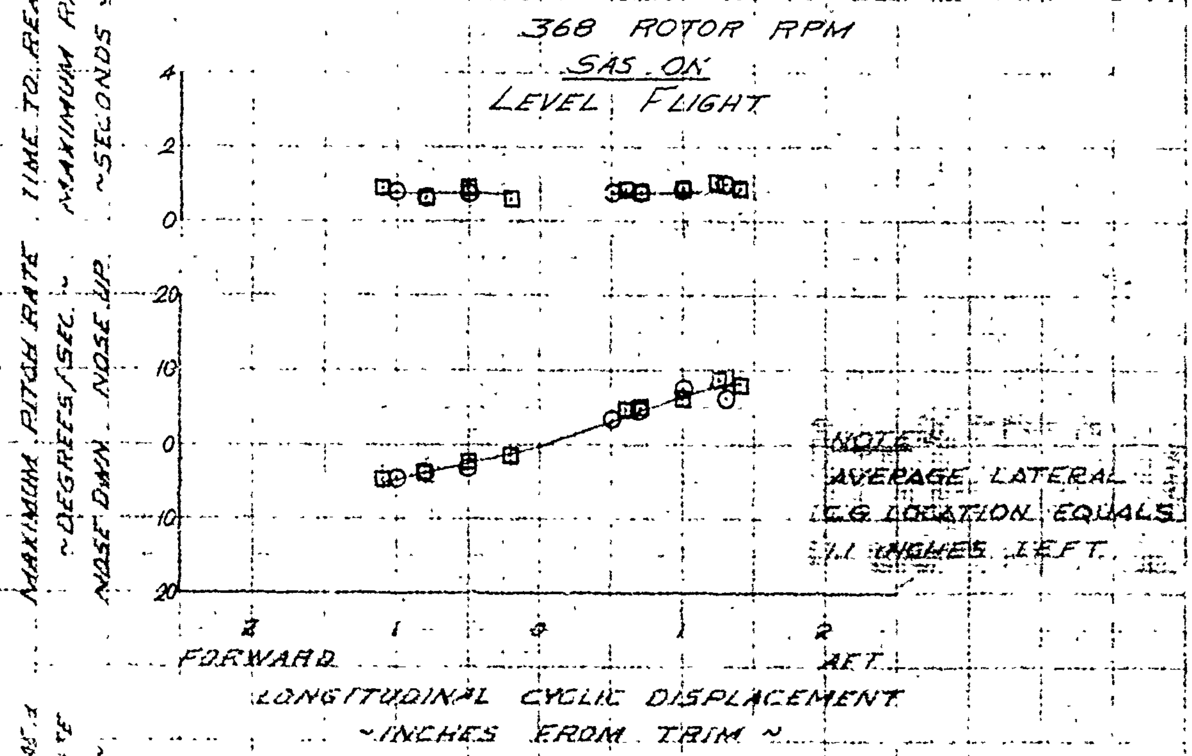
NOTE
AVERAGE LATERAL C.G. LOCATION EQUALS 0.2 INCHES LEFT

FIGURE NO. 120

LONGITUDINAL CONTROL RESPONSE

OH-5A USA S/N 62-4210

SYM.	CAS ~KNOTS~	AVG G.W. ~LB~	AVG C.G. ~IN~	AVG H_p ~FT~	CONFIGURATION & FLT CONDITION	
○	35	2730	101.2 (AFT)	4700	XM-7	LEVEL
□	77	2690	101.1 (AFT)	4700	XM-7	LEVEL
△	48.5	2680	101.1 (AFT)	5000	XM-7	CLIMB
▽	55.5	2610	101.1 (AFT)	5000	XM-7	AUTO



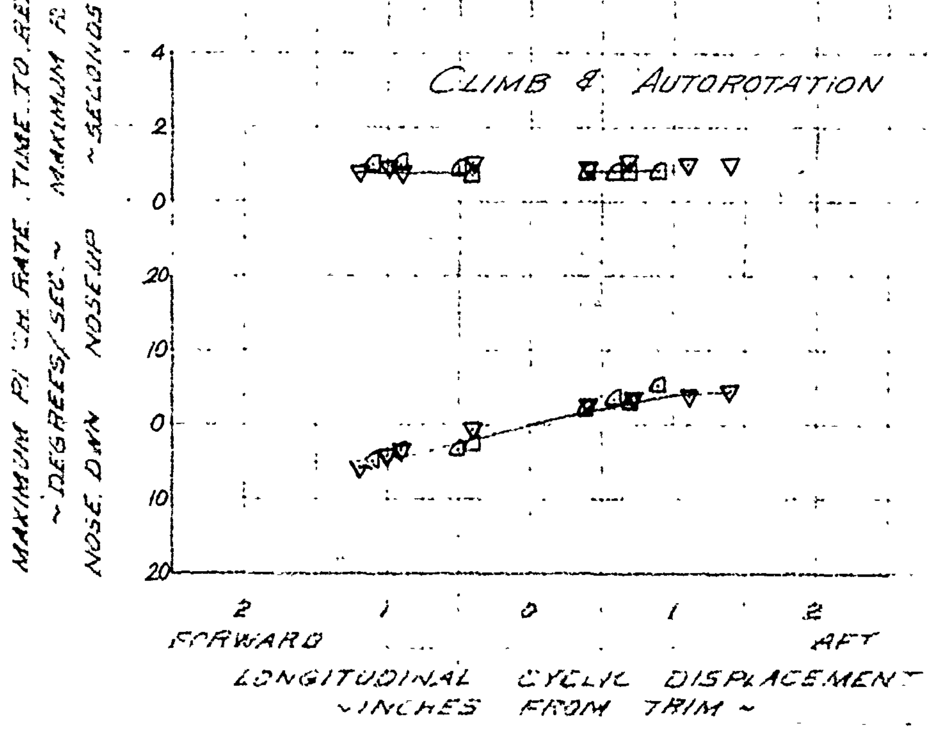


FIGURE No. 121

LONGITUDINAL CONTROL RESPONSE

OH-5A USA S/N 62-4210

SYM.	CAS ~KNOTS~	AVG. G.W. ~LB~	AVG C.G. ~IN~	AVG H_p ~FT~	CONFIGURATION & FLT CONDITION	
○	35	2720	101.2 (AFT)	4800	XM-8	LEVEL
□	77	2680	101.2 (AFT)	4800	XM-8	LEVEL
◇	0	2680	101.2 (AFT)	1600	XM-8	HOVER (IGE)
△	48.5	2770	101.2 (AFT)	5000	XM-8	CLIMB
▽	555	2730	101.2 (AFT)	5000	XM-8	AUTO

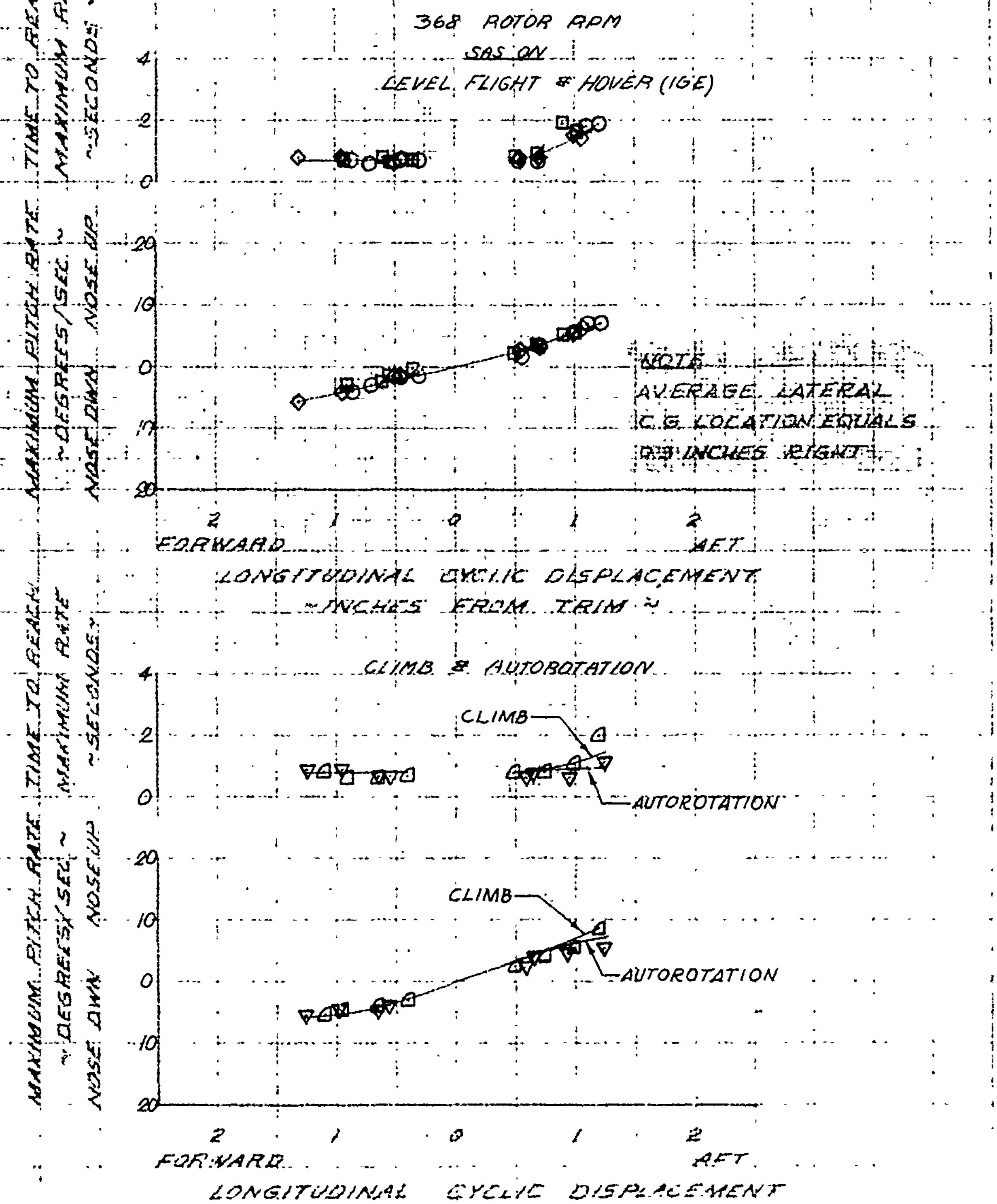


FIGURE No. 122

LONGITUDINAL CONTROL RESPONSE

OH-5A USA S/N 62-4209

SYM	CAS ~KNOTS~	AVG. G.W. ~LB~	AVG. C.G. ~IN~	AVG H_p ~FT~	CONFIGURATION & FLT CONDITION	
○	35	2650	101.4 (AFT)	5000	CLEAN	LEVEL
□	77.5	2720	101.4 (AFT)	5900	CLEAN	LEVEL
△	49	2730	101.4 (AFT)	5000	CLEAN	CLIMB
▽	55.5	2720	101.4 (AFT)	5000	CLEAN	AUTO

368 ROTOR RPM

SAS OFF

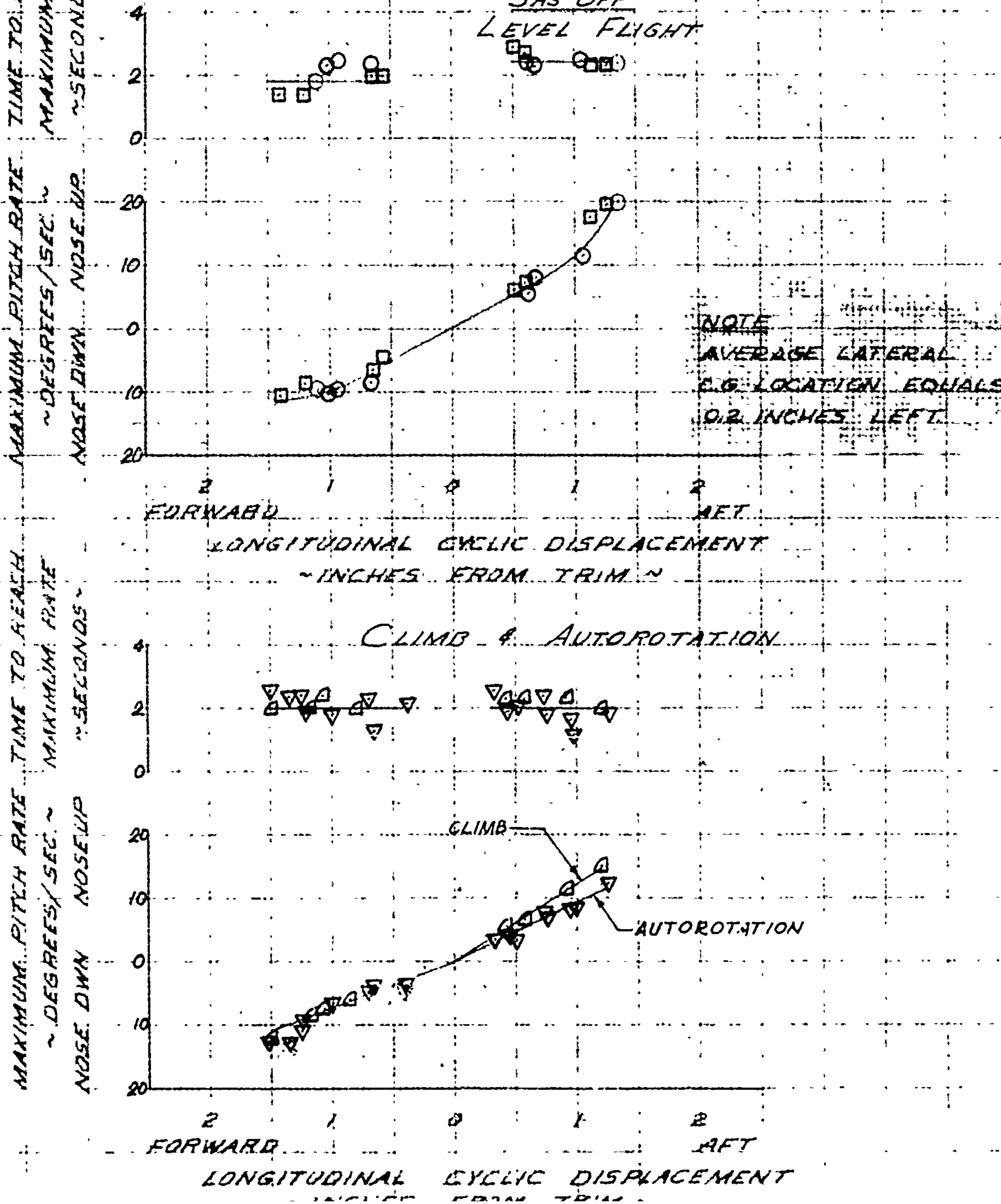


FIGURE NO. 123

LONGITUDINAL CONTROL RESPONSE

OH-5A USA S/N 62-4209

SYM.	CAS ~KNOTS~	AVG G.W. ~LB~	AVG CG ~IN~	AVG H_o ~FT~	CONFIGURATION & FLT CONDITION	
○	36	2720	101.4 (AFT)	9800	CLEAN	LEVEL
□	61.5	2700	101.4 (AFT)	10000	CLEAN	LEVEL
△	48.5	2730	95.6 (FWD)	5000	CLEAN	CLIMB
▽	55.5	2720	95.6 (FWD)	5000	CLEAN	AUTO
⊖	47.5	2730	101.4 (AFT)	10000	CLEAN	CLIMB

368 ROTOR RPM

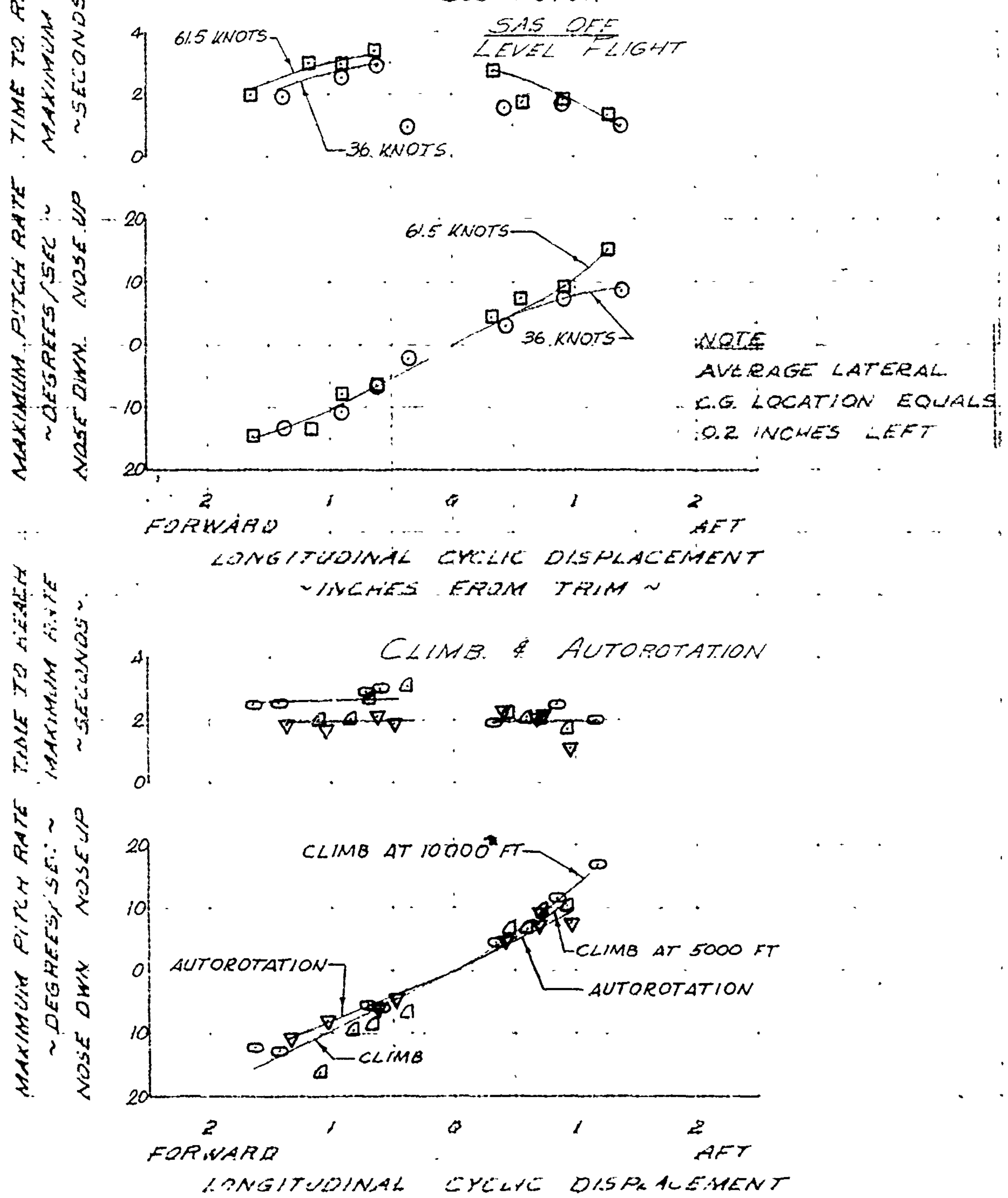
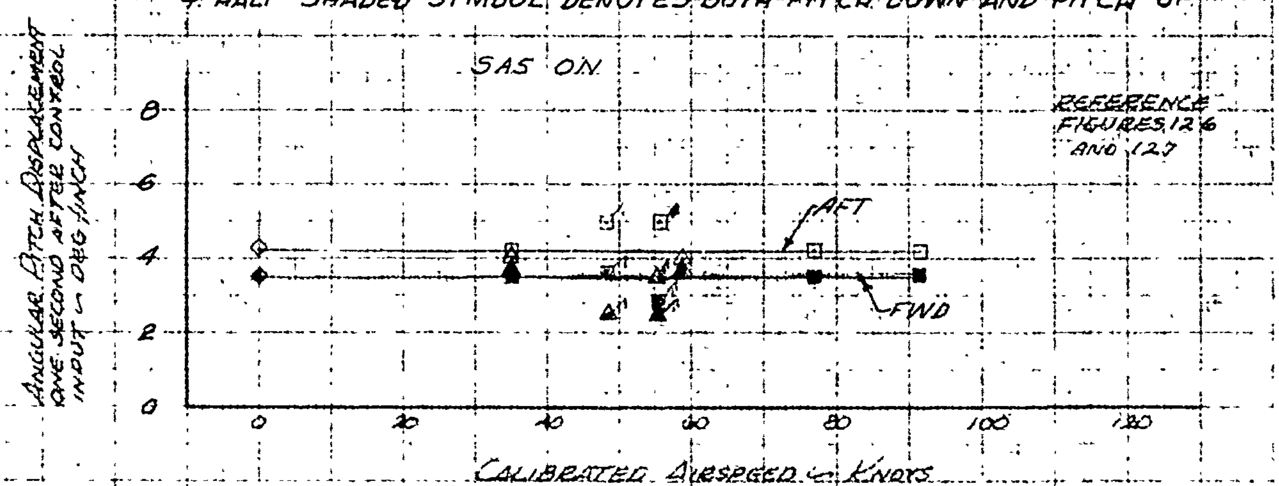


FIGURE NO. 124
SUMMARY OF ANGULAR PITCH DISPLACEMENT
OH-5A USA S/N 62-4209 & 10

SYM	AVG H_p ~FT	AVG G.W. ~LB	AVG C.G ~IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT. COND.
⊙	1600	2730	101.4(AFT)	0.2 LT	368	CLEAN	HOVER (IGE)
⊡	5300	2720	101.4(AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED
△	10,000	2640	101.3(AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED

NOTE:
1. SHADED SYMBOLS DENOTE PITCH DOWN.
2. SINGLE FLAG ON SYMBOL DENOTES CLIMB.
3. DOUBLE FLAG ON SYMBOL DENOTES AUTOROTATION.
4. HALF SHADED SYMBOL DENOTES BOTH PITCH DOWN AND PITCH UP.



SYM	AVG H_p ~FT	AVG G.W. ~LB	AVG C.G. ~IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT. COND.
◇	1200	2710	95.5(FWD)	0.2 LT	368	CLEAN	HOVER (IGE)
⦶	5200	2700	95.4(FWD)	0.2 LT	368	CLEAN	LEVEL & NOTED
⊞	5200	2970	95.6(FWD)	0.2 LT	368	CLEAN	LEVEL & NOTED

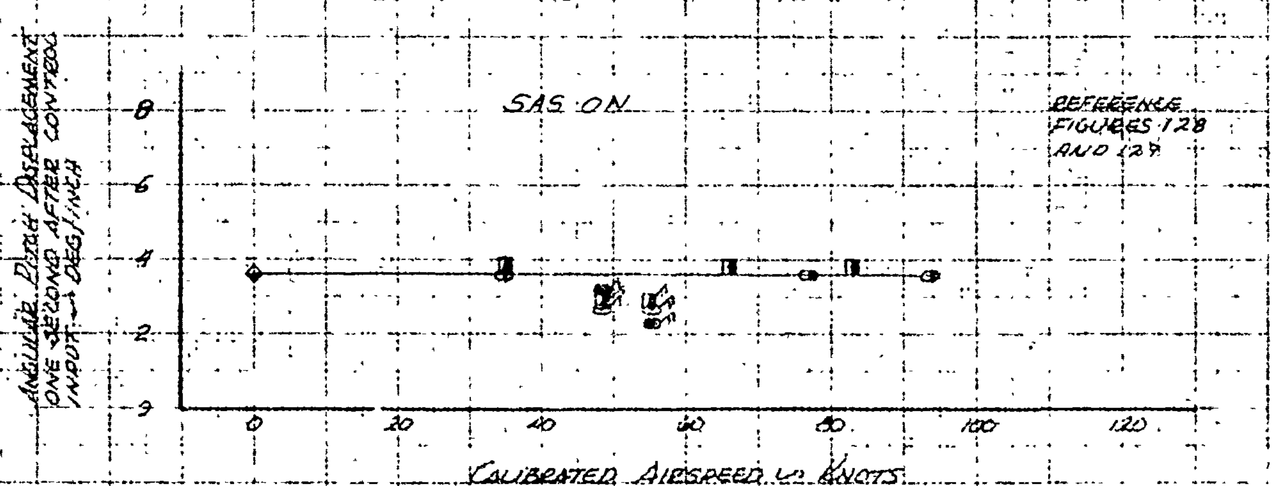
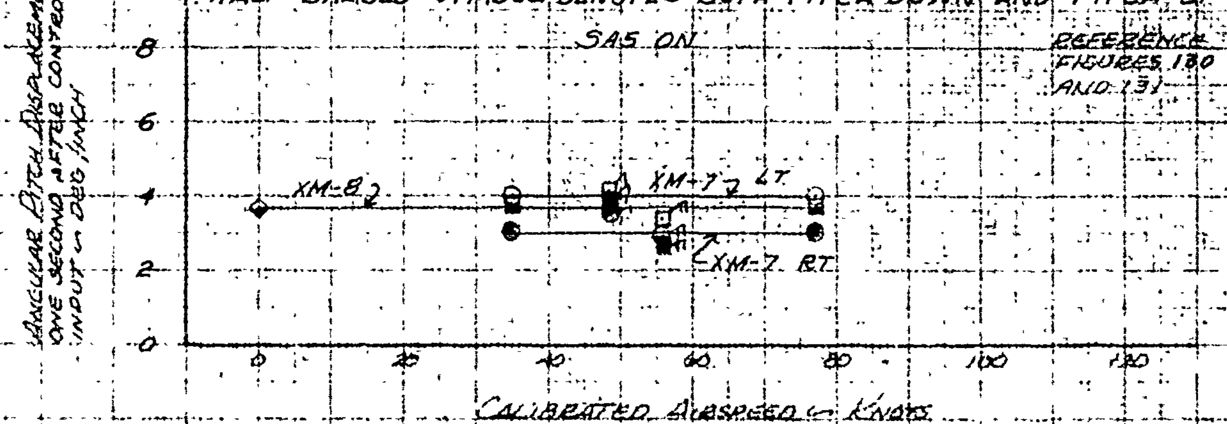


FIGURE No. 125
SUMMARY OF ANGULAR PITCH DISPLACEMENT
OH-6A USA S/N 62-4209 & 10

SYM	AVG H_p ~ FT	AVG G.W. ~ LB	AVG C.G ~ IN LONG	AVG C.G ~ IN LAT	ROTOR RPM	CONFIGURATION	FLT. COND.
⊕	4900	2700	101.2 (AFT)	1.1 LT	368	XM-7	LEVEL & NOTED
◇	1600	2680	101.2 (AFT)	0.3 RT	368	XM-8	HOVER (IGE)
⊡	4900	2720	101.2 (AFT)	0.3 RT	368	XM-8	LEVEL & NOTED

NOTE:
1. SHADED SYMBOLS DENOTE PITCH DOWN.
2. SINGLE FLAG ON SYMBOL DENOTES CLIMB.
3. DOUBLE FLAG ON SYMBOL DENOTES AUTOROTATION.
4. HALF SHADED SYMBOL DENOTES BOTH PITCH DOWN AND PITCH UP



SYM	AVG H_p ~ FT	AVG G.W. ~ LB	AVG C.G. ~ IN LONG	AVG C.G. ~ IN LAT	ROTOR RPM	CONFIGURATION	FLT. COND.
◇	5200	2700	101.4 (AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED
⊕	9900	2720	101.4 (AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED
⊕	5000	2730	95.6 (FWD)	0.2 LT	368	CLEAN	LEVEL & NOTED

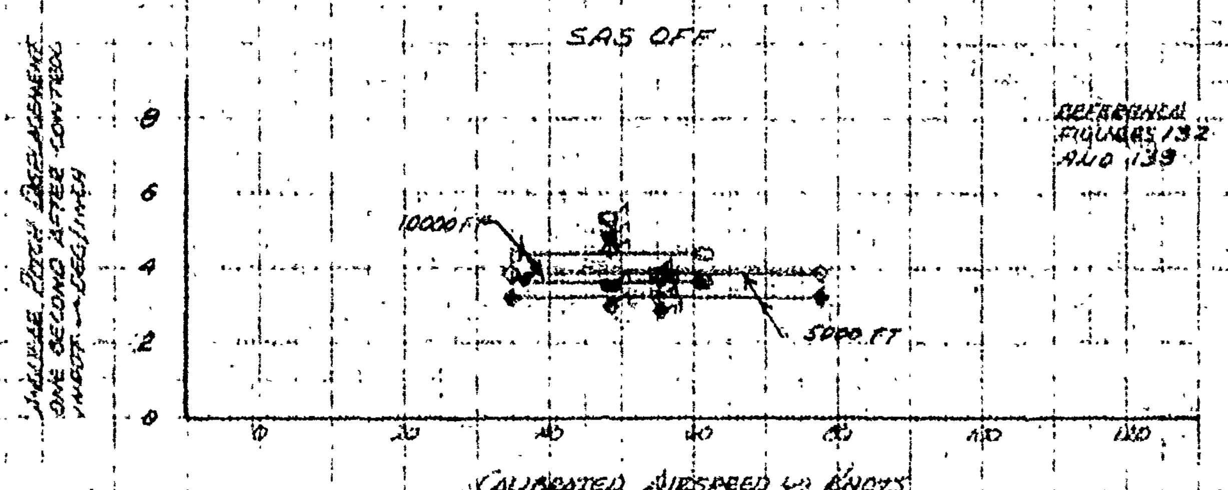


FIGURE NO. 126

ANGULAR PITCH DISPLACEMENT

OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG G.W. ~LB~	AVG. C.G. ~IN~	AVG. H_D ~FT~	CONFIGURATION & FLT CONDITION	
○	35	2730	101.4 (AFT)	5600	CLEAN	LEVEL
□	77	2710	101.3 (AFT)	5600	CLEAN	LEVEL
△	91.5	2680	101.3 (AFT)	5500	CLEAN	LEVEL
◇	0	2730	101.4 (AFT)	1600	CLEAN	HOVER (IGE)
⌂	48.5	2740	101.4 (AFT)	5000	CLEAN	CLIMB
▽	55.5	2730	101.4 (AFT)	5000	CLEAN	AUTO

368 ROTOR RPM

SAS ON

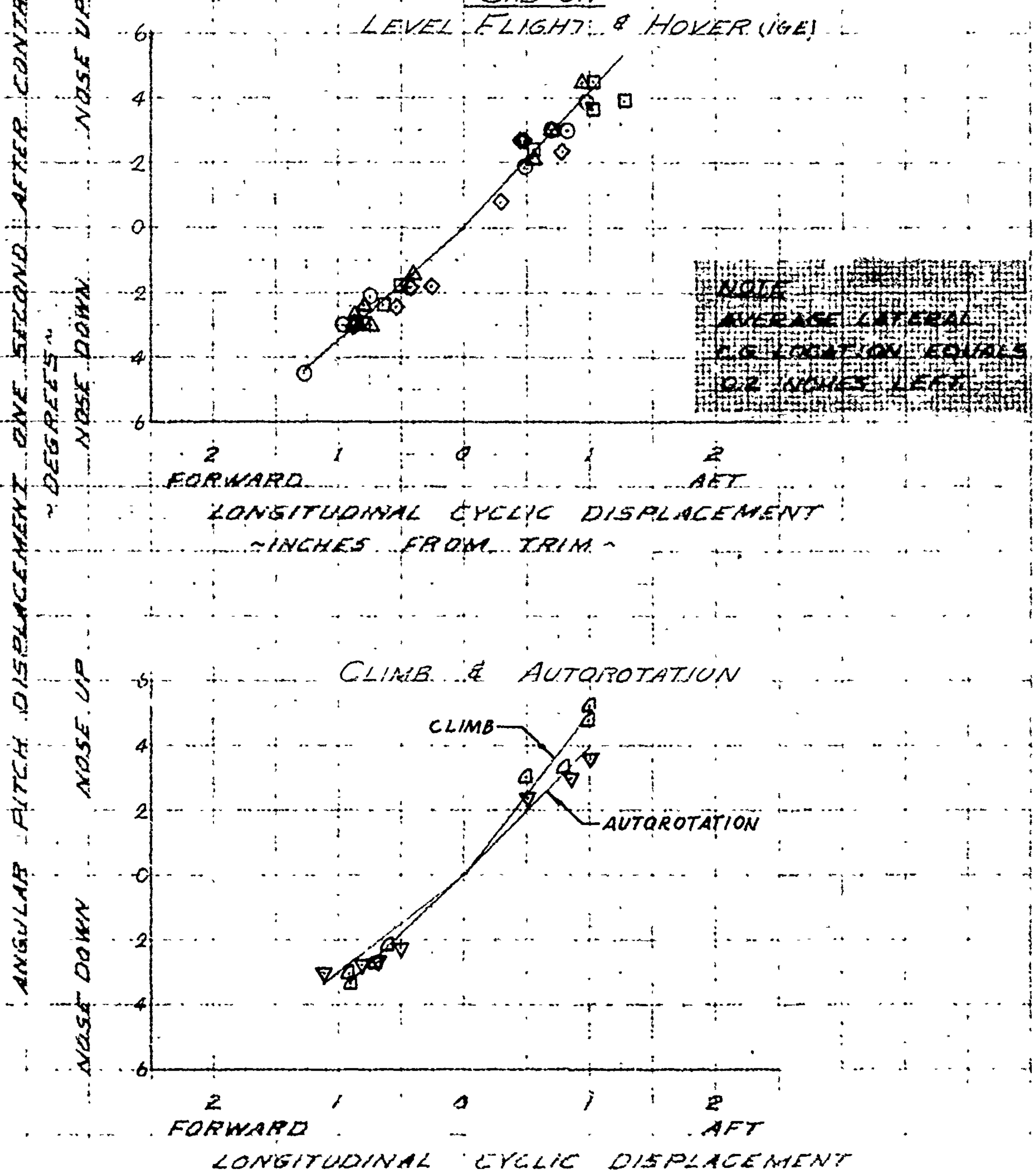


FIGURE No. 127

ANGULAR PITCH DISPLACEMENT

OH-5A USA S/N 62-4210

SYM.	CAS ~KNOTS~	AVG. GW. ~LB~	AVG. C.G. ~IN~	AVG. H_o ~FT~	CONFIGURATION & FLT CONDITION
○	35	2710	101.4 (AFT)	10000	CLEAN LEVEL
□	58.5	2680	101.3 (AFT)	9900	CLEAN LEVEL
△	PITCH ANGLE NOT AVAILABLE				
◁	48.5	2620	101.3 (AFT)	10000	CLEAN CLIMB
▽	55.5	2610	101.3 (AFT)	10000	CLEAN AUTO

368 ROTOR RPM

SAS ON

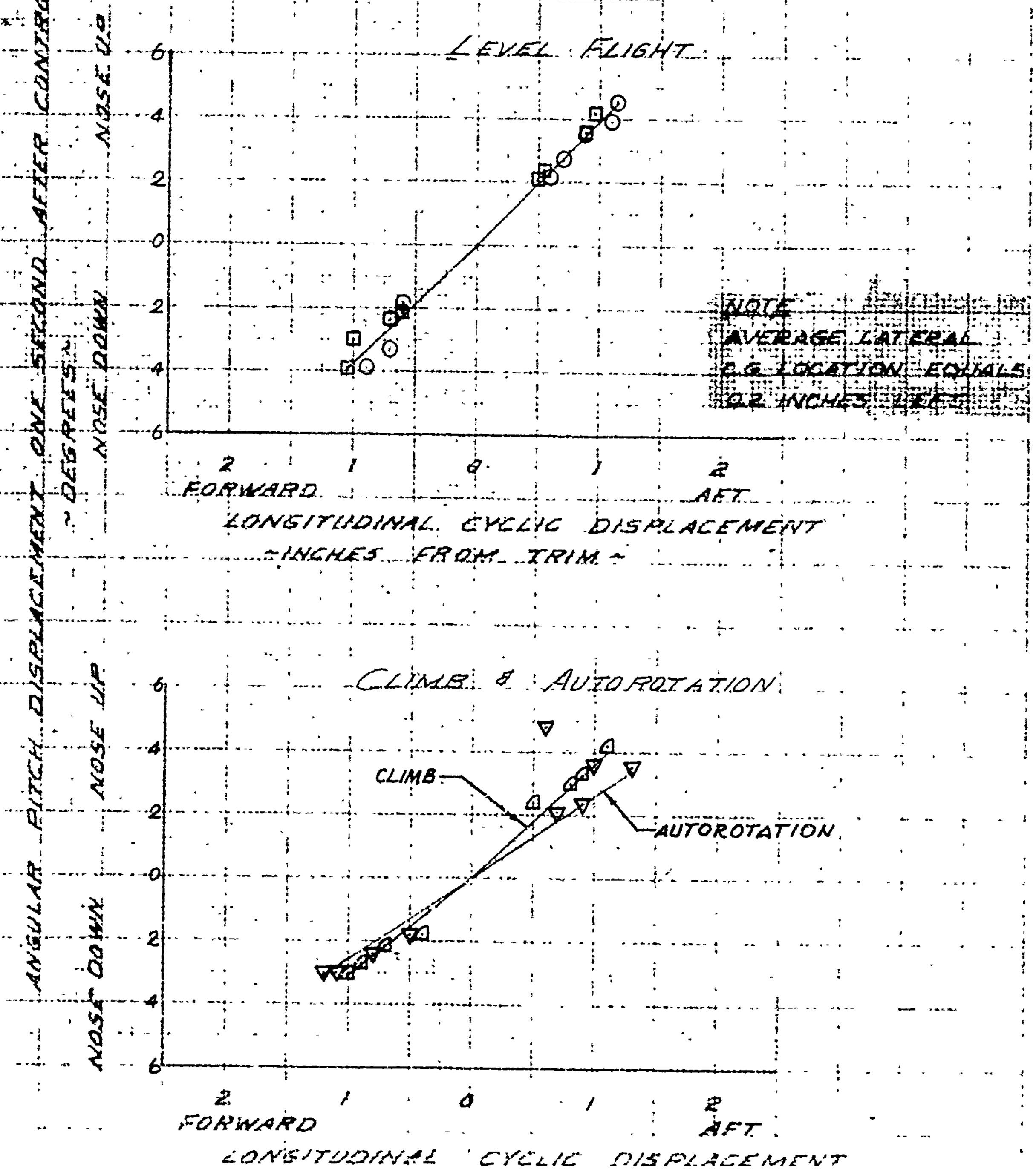


FIGURE NO. 128

ANGULAR PITCH DISPLACEMENT

OH-5A USA S/N 62-4210 (62-4209 HOVER)

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG CG ~IN~	AVG H_o ~FT~	CONFIGURATION & FLT CONDITION	
○	35	2700	95.4 (FWD)	5800	CLEAN	LEVEL
□	77	2650	95.4 (FWD)	5600	CLEAN	LEVEL
△	93.5	2690	95.4 (FWD)	4800	CLEAN	LEVEL
◇	0	2710	95.5 (FWD)	1200	CLEAN	HOVER (IGE)
⊡	48.5	2730	95.5 (FWD)	5000	CLEAN	CLIMB
▽	55.5	2710	95.4 (FWD)	5000	CLEAN	AUTO

368 ROTOR RPM

SAS ON

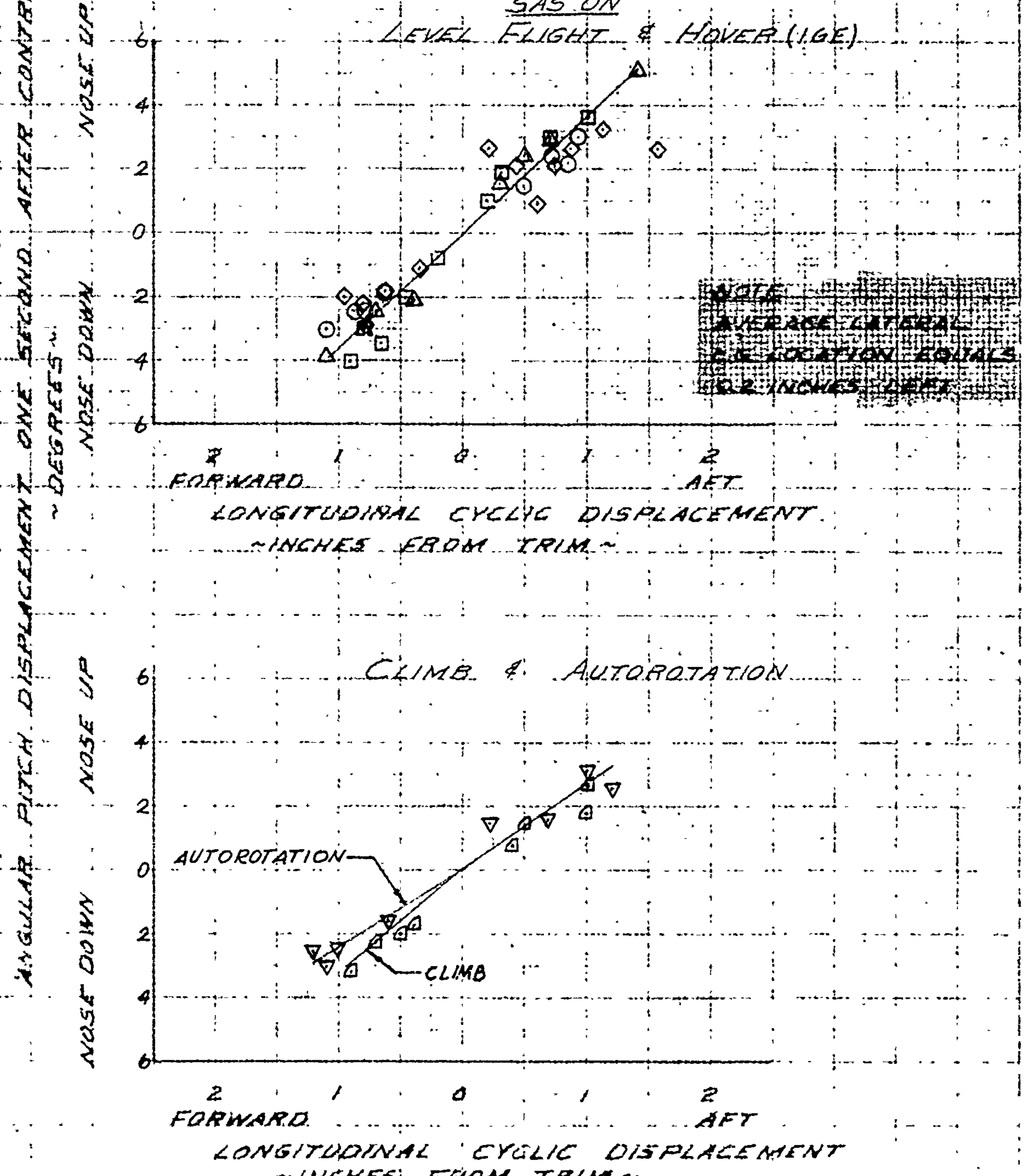


FIGURE NO. 129

ANGULAR PITCH DISPLACEMENT

OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG CG ~IN~	AVG H_o ~FT~	CONFIGURATION & FLT CONDITION
○	35	3000	95.6 (FWD)	5800	CLEAN LEVEL
□	66	2970	95.6 (FWD)	5100	CLEAN LEVEL
△	83	2940	95.6 (FWD)	5100	CLEAN LEVEL
◬	48.5	3010	95.7 (FWD)	5000	CLEAN CLIMB
▽	55.5	2970	95.6 (FWD)	5000	CLEAN AUTO

368 ROTOR RPM

SAS ON

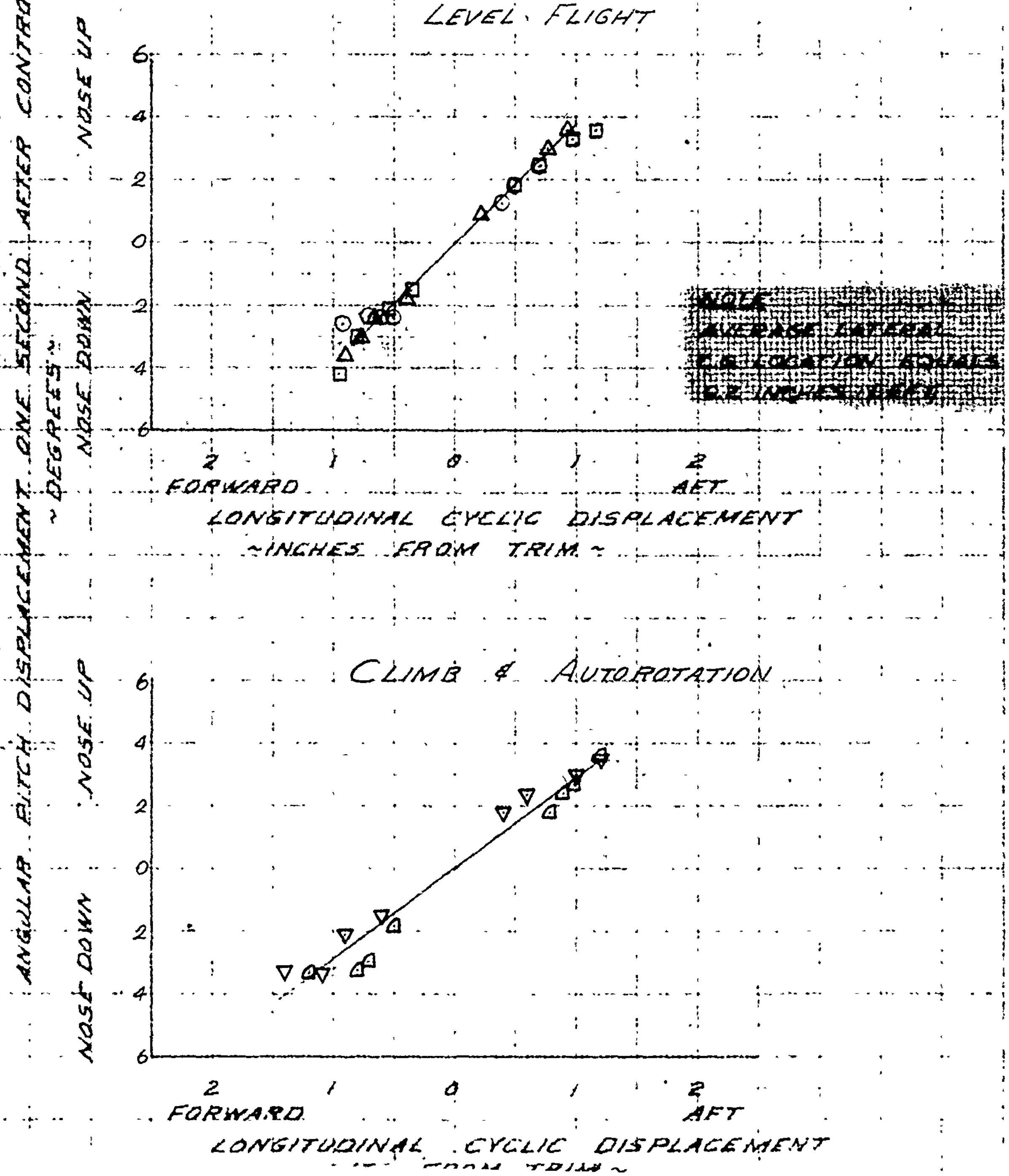


FIGURE No. 130

ANGULAR PITCH DISPLACEMENT

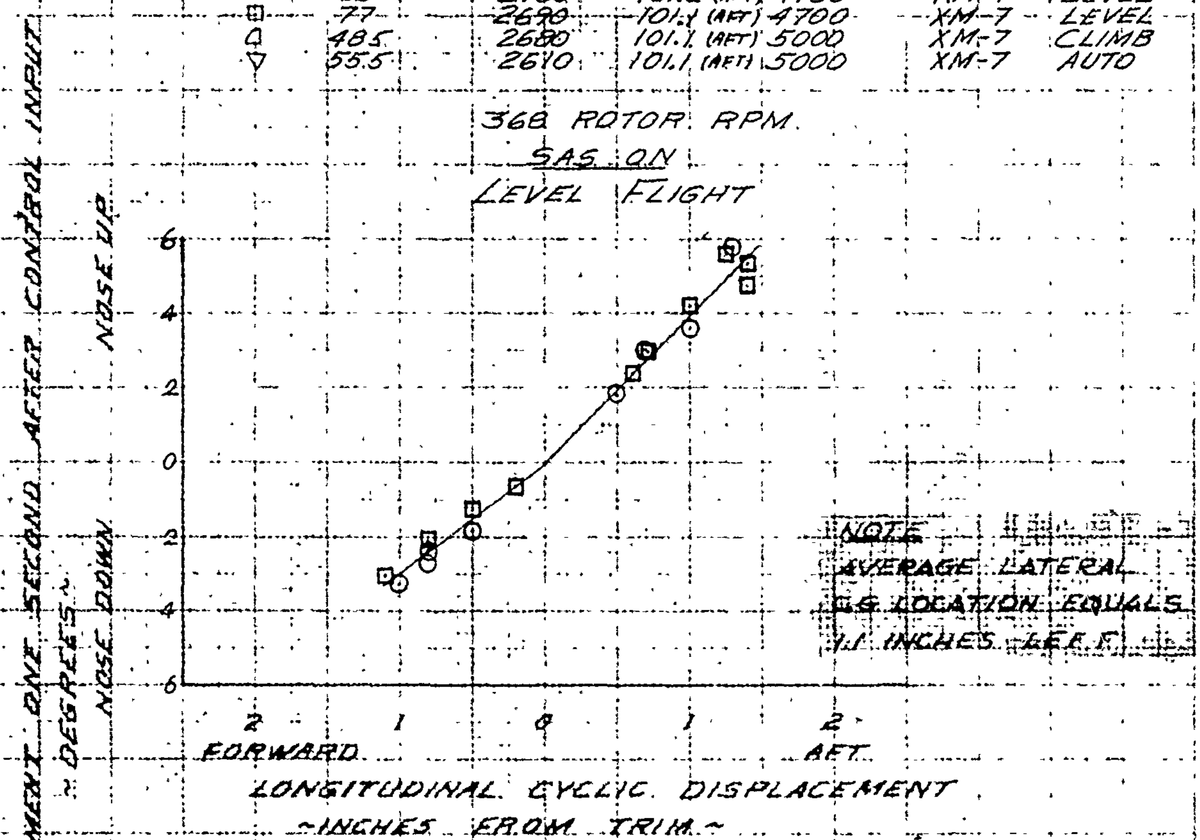
OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG CG ~IN~	AVG H_p ~FT~	CONFIGURATION & FLT CONDITION	
○	35	2730	101.2 (AFT)	4700	XM-7	LEVEL
⊡	77	2690	101.1 (AFT)	4700	XM-7	LEVEL
△	48.5	2680	101.1 (AFT)	5000	XM-7	CLIMB
▽	55.5	2610	101.1 (AFT)	5000	XM-7	AUTO

368 ROTOR RPM

SAS ON

LEVEL FLIGHT



CLIMB & AUTOROTATION

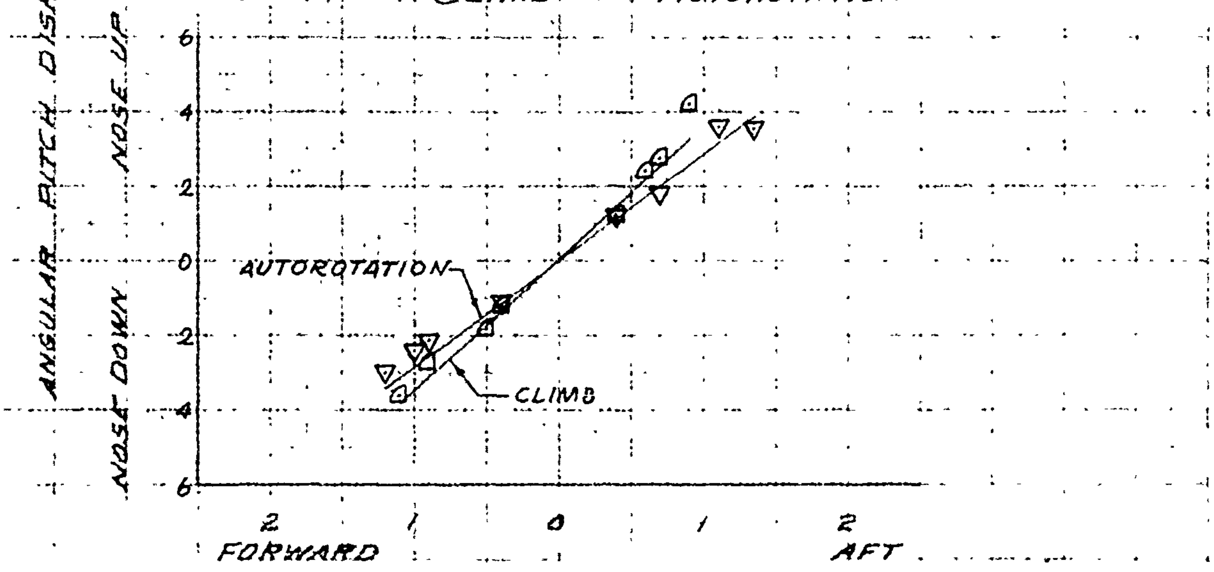


FIGURE No. 131

ANGULAR PITCH DISPLACEMENT

OH-5A USA S/N 62-4210

SYM.	CAS ~KNOTS~	AVG G.W. ~LB~	AVG C.G. ~IN~	AVG H_{ρ} ~FT~	CONFIGURATION & FLT CONDITION	
○	35	2720	101.2 (AFT)	4800	XM-8	LEVEL
□	77	2680	101.2 (AFT)	4800	XM-8	LEVEL
◇	0	2680	101.2 (AFT)	1600	XM-8	HOVER (IGE)
△	48.5	2740	101.2 (AFT)	5000	XM-8	CLIMB
▽	55.5	2730	101.2 (AFT)	5000	XM-8	AUTO

SAS ON

368 ROTOR RPM

LEVEL FLIGHT & HOVER (IGE)

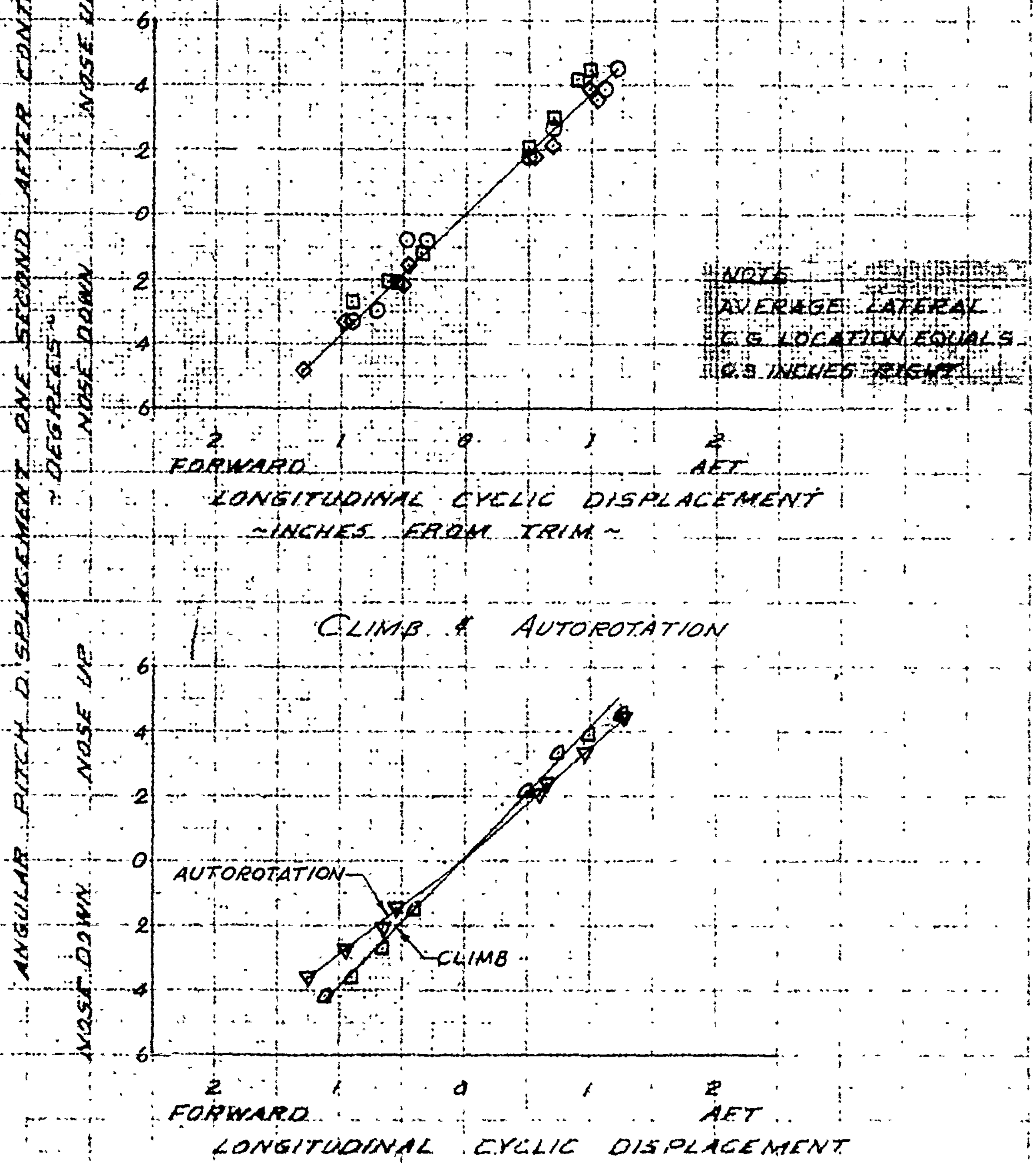


FIGURE NO. 132

ANGULAR PITCH DISPLACEMENT

OH-5A USA S/N 62-4209

SYM	CAS ~KNOTS~	AVG. G.W. ~LB~	AVG. C.G. ~IN~	AVG. H_o ~FT~	CONFIGURATION & FLT CONDITION	
○	35	2650	101.4 (AFT)	5000	CLEAN	LEVEL
⊡	77.5	2720	101.4 (AFT)	5900	CLEAN	LEVEL
◬	49	2730	101.4 (AFT)	5000	CLEAN	CLIMB
▽	55.5	2720	101.4 (AFT)	5000	CLEAN	AUTO

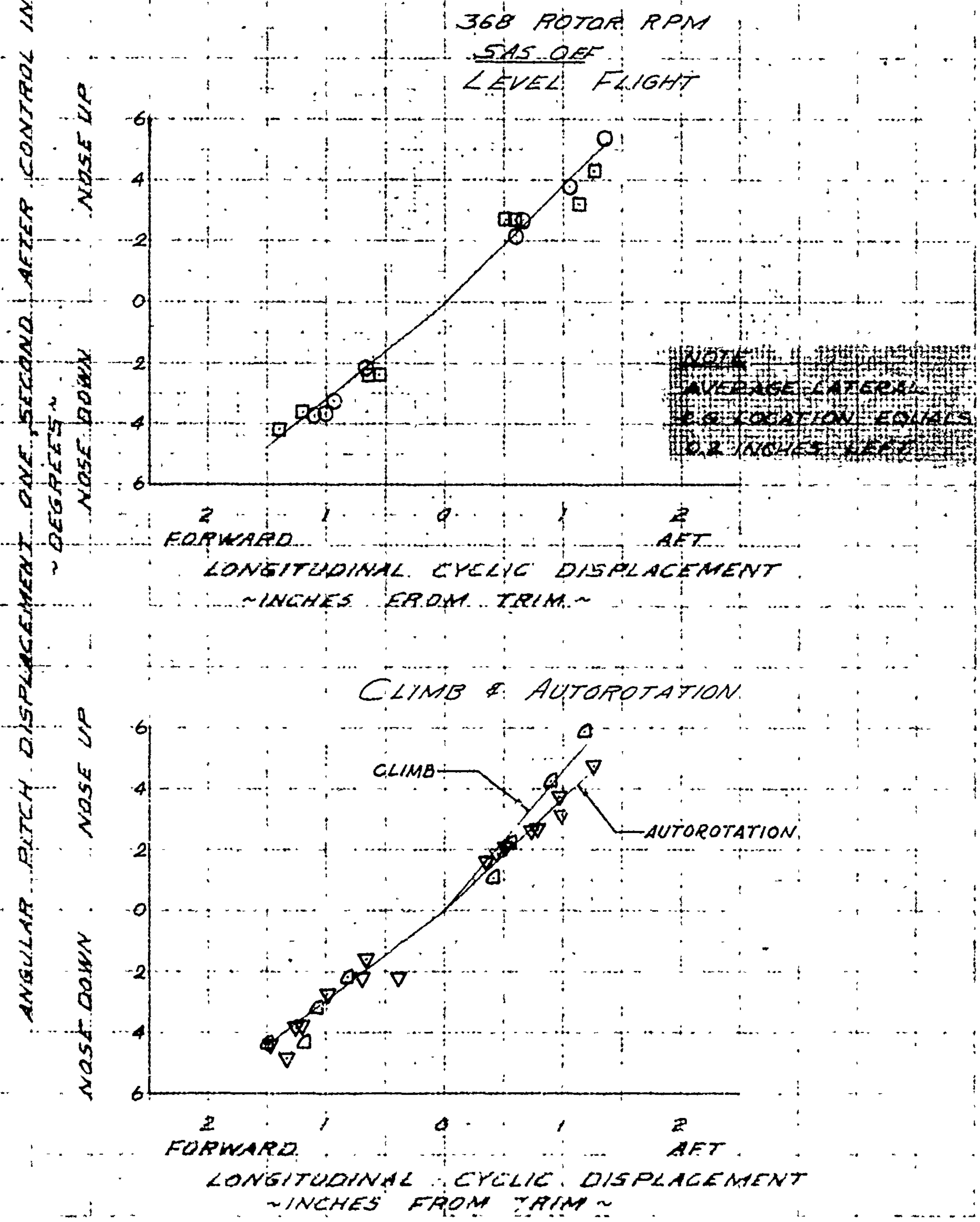


FIGURE No. 133

ANGULAR PITCH DISPLACEMENT

OH-5A USA S/N 62-4209.

SYM	CAS ~KNOTS~	AVG. GW. ~LB~	AVG. CG ~IN~	AVG. H_o ~FT~	CONFIGURATION & FLT CONDITION	
○	36	2720	101.4 (AFT)	9800	CLEAN	LEVEL
⊡	61.5	2700	101.4 (AFT)	10000	CLEAN	LEVEL
△	48.5	2730	95.6 (FWD)	5000	CLEAN	CLIMB
▽	55.5	2720	95.6 (FWD)	5000	CLEAN	AUTO
⊖	47.5	2730	101.4 (AFT)	10000	CLEAN	CLIMB

368 ROTOR RPM

SAS OFF

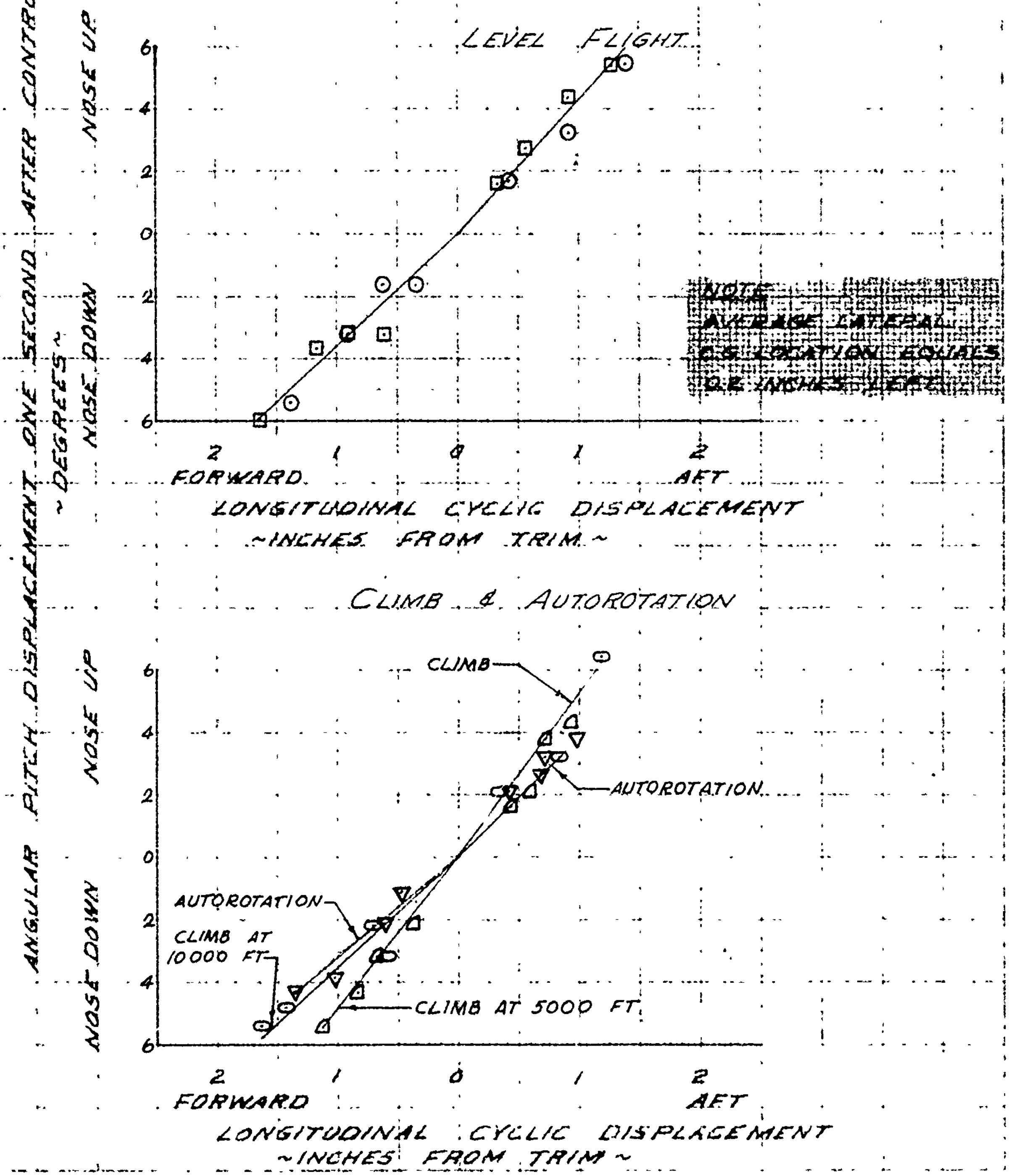


FIGURE No. 134

SUMMARY OF LATERAL CONTROL SENSITIVITY

OH-A USA S/N 62-4210

SYM	AVG H_p ~FT	AVG G.W ~LB	AVG C.G ~ IN LONG	AVG C.G ~ IN LAT	ROTOR RPM	CONFIGURATION	FLT COND
◇	1600	2700	101.4 (AFT)	0.2 LT	368	CLEAN	HOVER (IGE)
□	5100	2700	101.4 (AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED
△	10000	2650	101.3 (AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED

NOTE

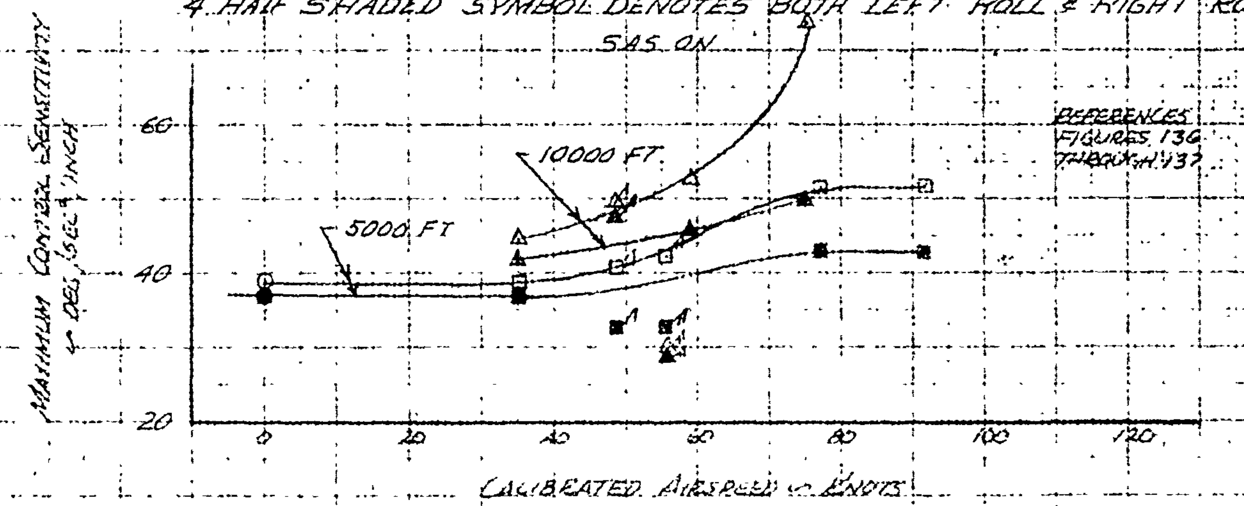
1 SHADED SYMBOLS DENOTE LEFT ROLL

2 SINGLE FLAG ON SYMBOL DENOTES CLIMB.

3 DOUBLE FLAG ON SYMBOL DENOTES AUTOROTATION

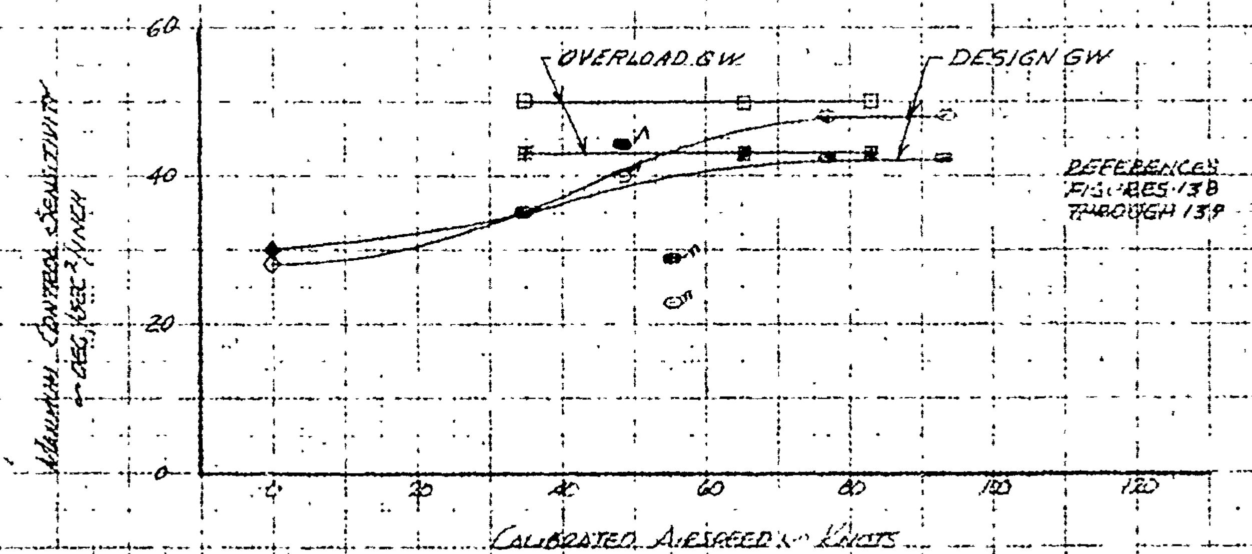
4 HALF SHADED SYMBOL DENOTES BOTH LEFT ROLL & RIGHT ROLL

SAS ON



SYM	AVG H_p ~FT	AVG G.W ~LB	AVG C.G ~ IN LONG	AVG C.G ~ IN LAT	ROTOR RPM	CONFIGURATION	FLT COND
◇	1400	2690	95.6 (FWD)	0.2 LT	368	CLEAN	HOVER (IGE)
○	4900	2700	95.4 (FWD)	0.2 LT	368	CLEAN	LEVEL & NOTED
□	5000	2970	95.2 (FWD)	0.2 LT	368	CLEAN	LEVEL & NOTED

SAS ON.

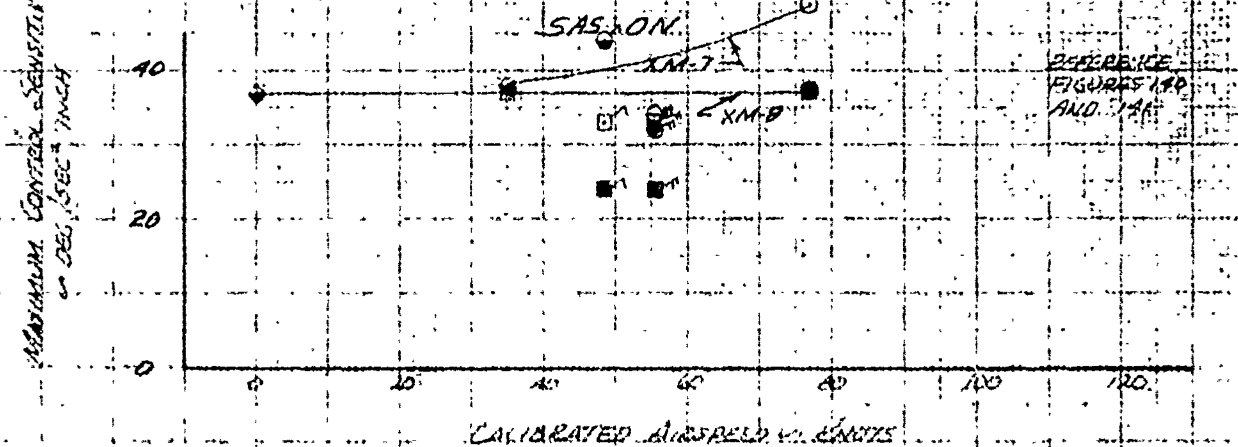


FOR OFFICIAL USE ONLY

FIGURE No. 135
SUMMARY OF LATERAL CONTROL SENSITIVITY
OH-5A USA S/N 62-4210 (62-4209 SAS OFF)

SYM	AVG H_D ~FT	AVG G.W. ~LB	AVG C.G. ~IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT COND
⊕	4900	2640	101.1(AFT)	1.1 LT	368	XM-7	LEVEL & NOTED
◇	1500	2700	101.2(AFT)	0.3 RT	368	XM-8	HOVER (IGE)
⊞	4900	2690	101.2(AFT)	0.3 RT	368	XM-8	LEVEL & NOTED

NOTE
1. SHADED SYMBOLS DENOTE LEFT ROLL
2. SINGLE FLAG ON SYMBOL DENOTES CLIMB
3. DOUBLE FLAG ON SYMBOL DENOTES AUTOROTATION
4. HALF SHADED SYMBOL DENOTES BOTH RIGHT ROLL AND LEFT ROLL



SYM	AVG H_D ~FT	AVG G.W. ~LB	AVG CG ~IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT COND
◇	5800	2660	101.4(AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED
○	9900	2700	101.4(AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED

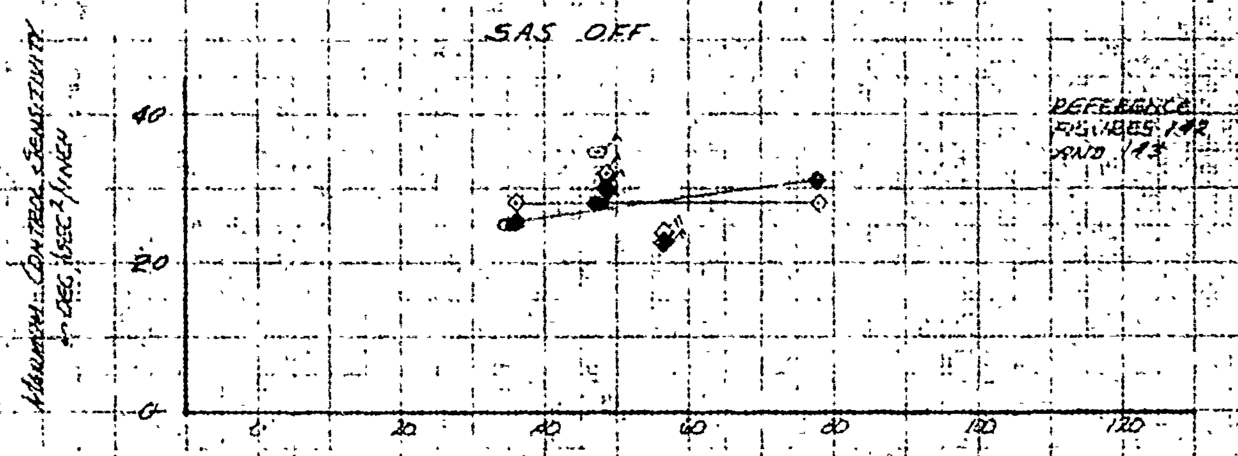


FIGURE NO 13.6

LATERAL CONTROL SENSITIVITY

OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG LONG C.G. ~IN~	AVG LAT C.G. ~IN~	AVG H_o ~FT~	ROTOR ~RPM~	CONFIGURATION	FLT CONDITION
⊙	35	2725	101.4 (AFT)	0.2 LT	5100	368	CLEAN	LEVEL
⊡	77	2680	101.4 (AFT)	0.2 LT	5200	368	CLEAN	LEVEL
◇	0	2700	101.4 (AFT)	0.2 LT	1600	368	CLEAN	HOVER (IGE)
△	48.5	2710	101.4 (AFT)	0.2 LT	5000	368	CLEAN	CLIMB
▽	55.5	2700	101.4 (AFT)	0.2 LT	5000	368	CLEAN	AUTO

SAS ON

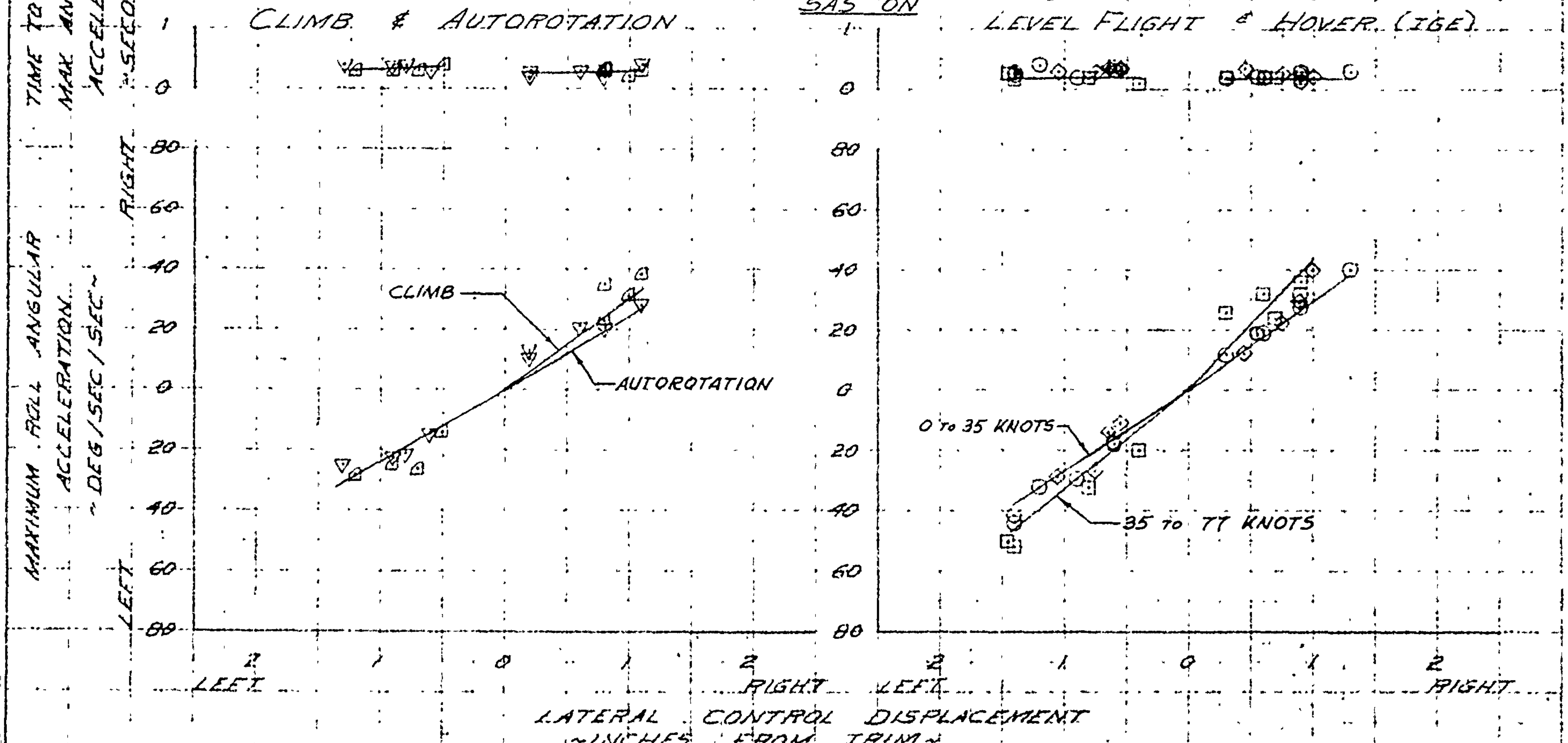


FIGURE No. 13.7

LATERAL CONTROL SENSITIVITY

OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG LONG C.G. ~IN~	AVG LAT C.G. ~IN~	AVG H_P ~FT~	ROTOR ~RPM~	CONFIGURATION	FLT CONDITION
○	35	2700	101.3 (AFT)	0.2 LT	10100	368	CLEAN	LEVEL
⊡	59	2640	101.3 (AFT)	0.2 LT	10100	368	CLEAN	LEVEL
△	75	2650	101.3 (AFT)	0.2 LT	10200	368	CLEAN	LEVEL
⌂	48.5	2590	101.3 (AFT)	0.2 LT	10000	368	CLEAN	CLIMB
▽	55.5	2570	101.2 (AFT)	0.2 LT	10000	368	CLEAN	AUTO

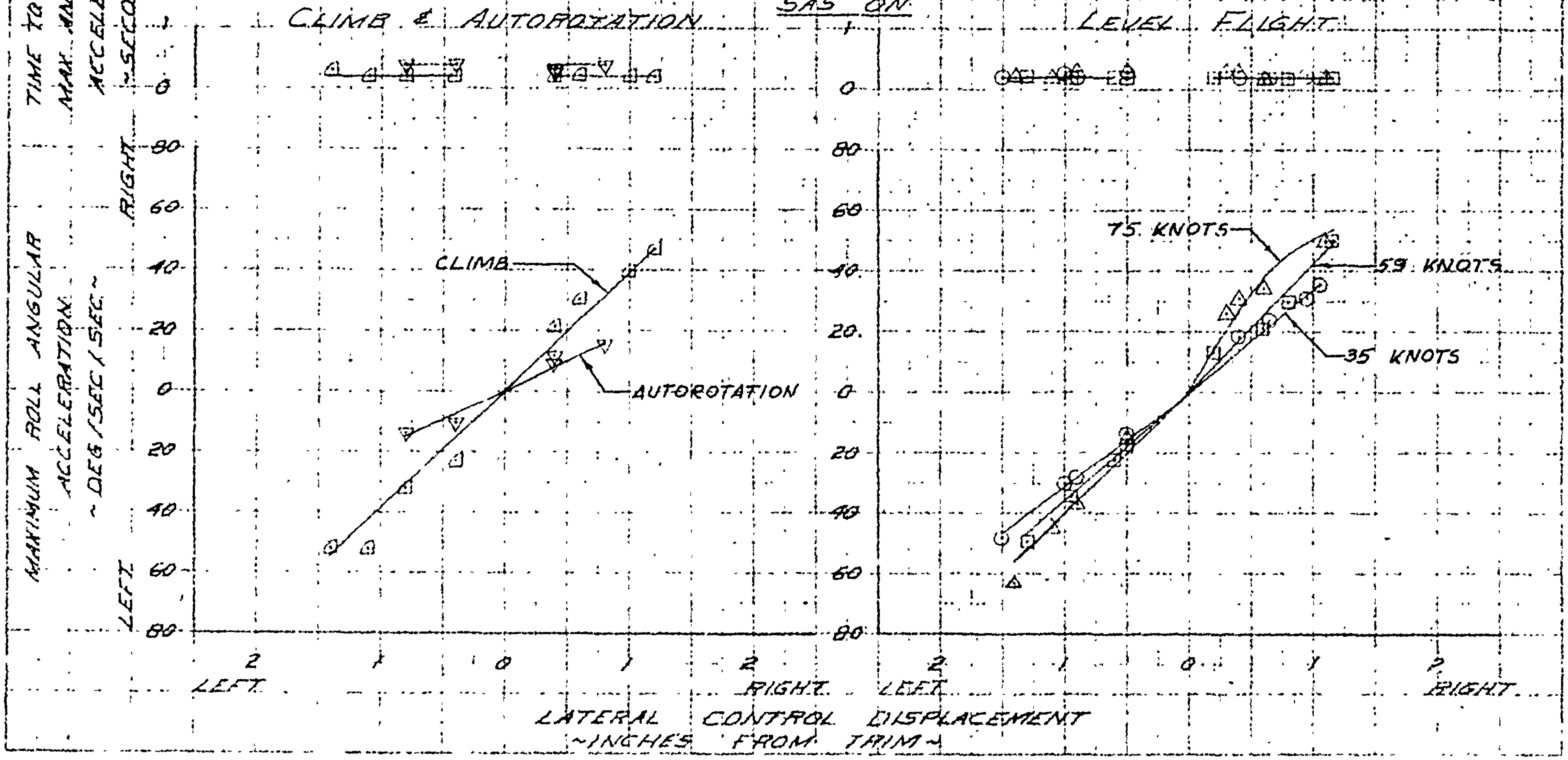


FIGURE No. 138

LATERAL CONTROL SENSITIVITY

OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG LONG CG ~IN~	AVG LAT CG ~IN~	AVG H_p ~FT~	ROTOR ~RPM~	CONFIGURATION	FLT CONDITION
○	35	2740	95.5 (FWD)	0.2 LT	4900	368	CLEAN	LEVEL
□	77	2720	95.5 (FWD)	0.2 LT	4900	368	CLEAN	LEVEL
△	93.5	2680	95.4 (FWD)	0.2 LT	4900	368	CLEAN	LEVEL
⊡	48.5	2690	95.4 (FWD)	0.2 LT	5000	368	CLEAN	CLIMB
▽	55.5	2610	95.3 (FWD)	0.2 LT	3000	368	CLEAN	AUTO
◇	0	2690	95.6 (FWD)	0.2 LT	1400	368	CLEAN	HOVER (IGE)

SAS ON

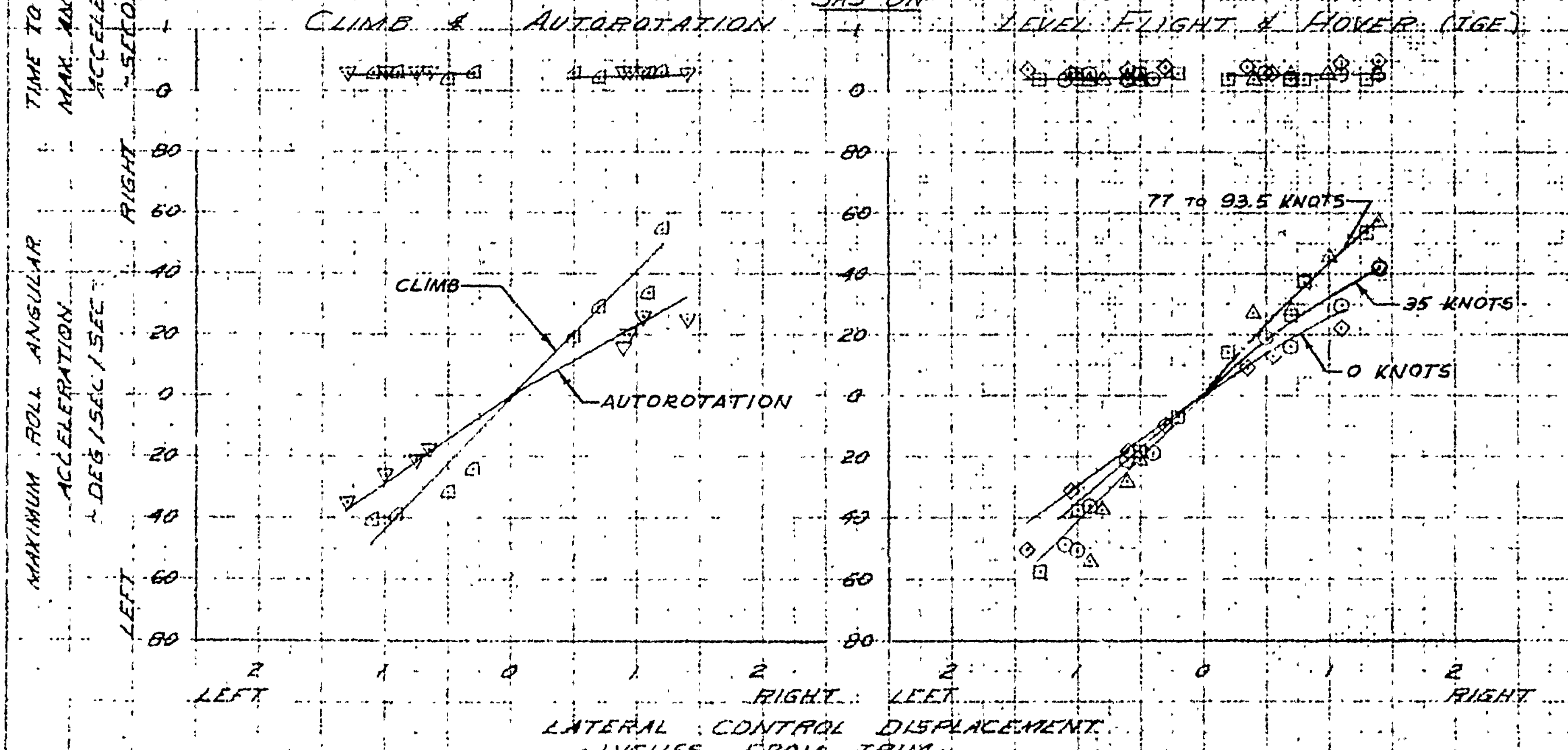


FIGURE No. 139

LATERAL CONTROL SENSITIVITY
OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG. G.W. ~LB~	AVG. LONG. C.G. ~IN~	AVG. LAT. C.G. ~IN~	AVG. H_p ~FT~	ROTOR ~RPM~	CONFIGURATION	FLT CONDITION
○	35	3020	95.7 (FWD)	0.2 LT	5000	368	CLEAN	LEVEL
⊡	65.5	2980	95.6 (FWD)	0.2 LT	5100	368	CLEAN	LEVEL
△	83	2930	95.5 (FWD)	0.2 LT	5100	368	CLEAN	LEVEL
⊕	48.5	2960	95.6 (FWD)	0.2 LT	5000	368	CLEAN	CLIMB
▽	55.5	2950	95.6 (FWD)	0.2 LT	5000	368	CLEAN	AUTO

SAS ON

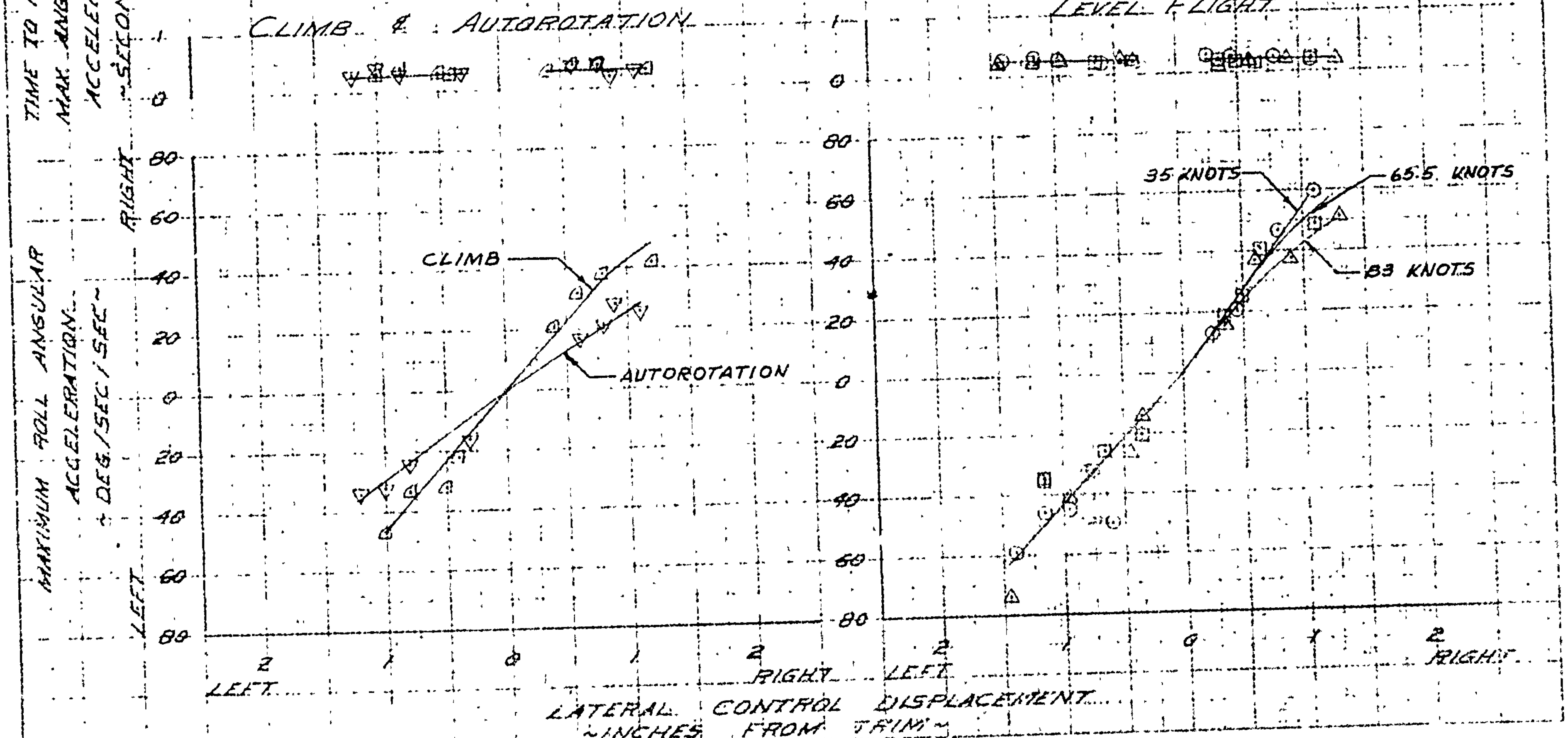


FIGURE No. 140

LATERAL CONTROL SENSITIVITY

OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG LONG CG ~IN~	AVG LAT CG ~IN~	AVG H_p ~FT~	ROTOR ~RPM~	CONFIGURATION	FLT CONDITION
○	35	2710	101.1 (AFT)	1.1 LT	4800	368	XM-7	LEVEL
□	77	2640	101.1 (AFT)	1.1 LT	4800	368	XM-7	LEVEL
◇	48.5	2600	101.0 (AFT)	1.1 LT	5000	368	XM-7	CLIMB
▽	55.5	2590	101.0 (AFT)	1.1 LT	5000	368	XM-7	AUTO

SAS ON

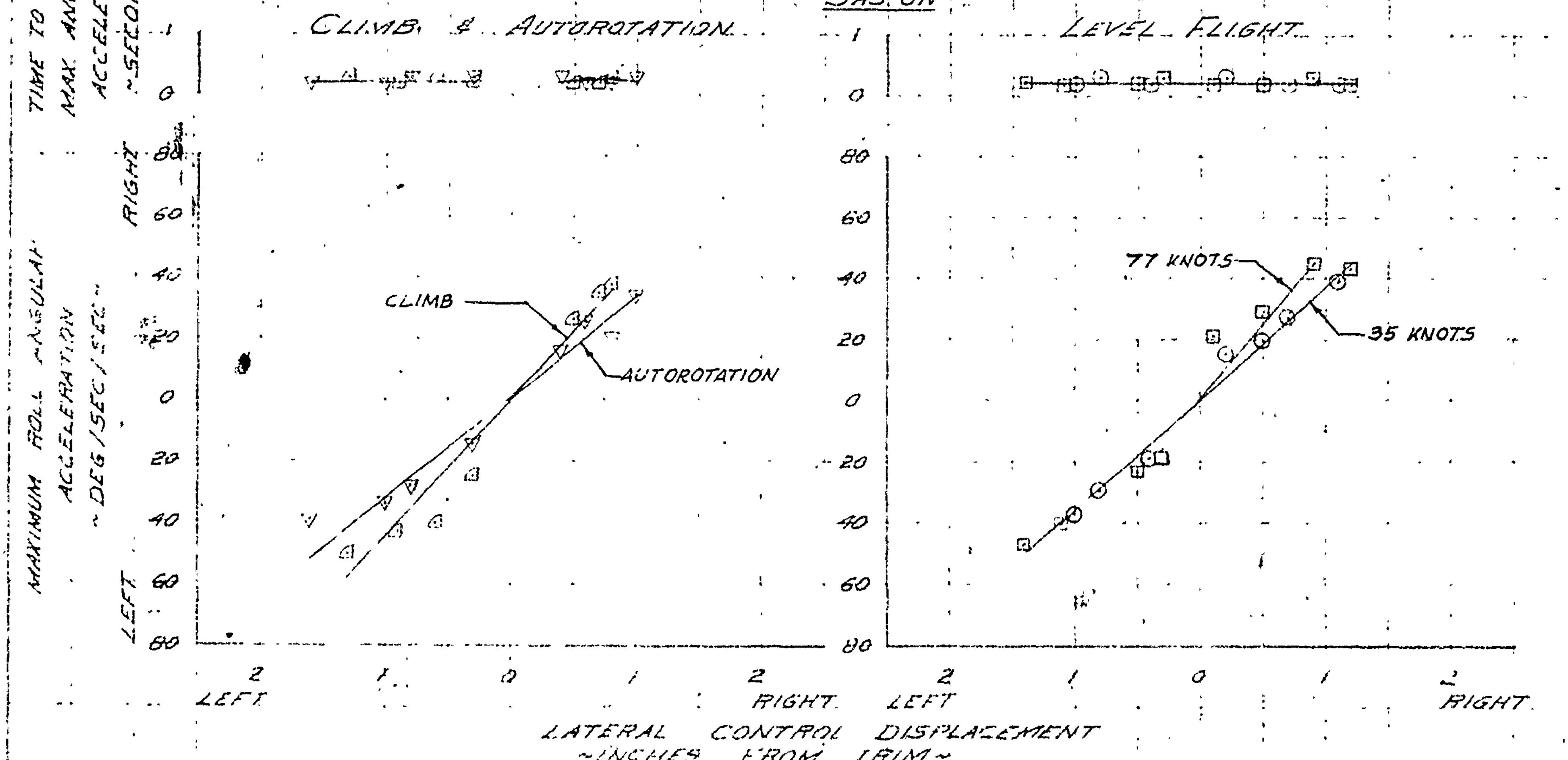


FIGURE No. 141

LATERAL CONTROL SENSITIVITY
OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG LONG CG ~IN~	AVG LAT CG ~IN~	AVG H_p ~FT~	ROTOR ~RPM~	CONFIGURATION	FLT CONDITION
○	35	2710	101.2 (AFT)	0.3 RT	4800	368	XM-8	LEVEL
□	77	2660	101.2 (AFT)	0.3 RT	4900	368	XM-8	LEVEL
◇	0	2700	101.2 (AFT)	0.3 RT	1500	368	XM-8	HOVER (IGE)
⌂	48.5	2700	101.2 (AFT)	0.3 RT	5000	368	XM-8	CLIMB
▽	55.5	2680	101.2 (AFT)	0.3 RT	5000	368	XM-8	AUTO

SAS ON

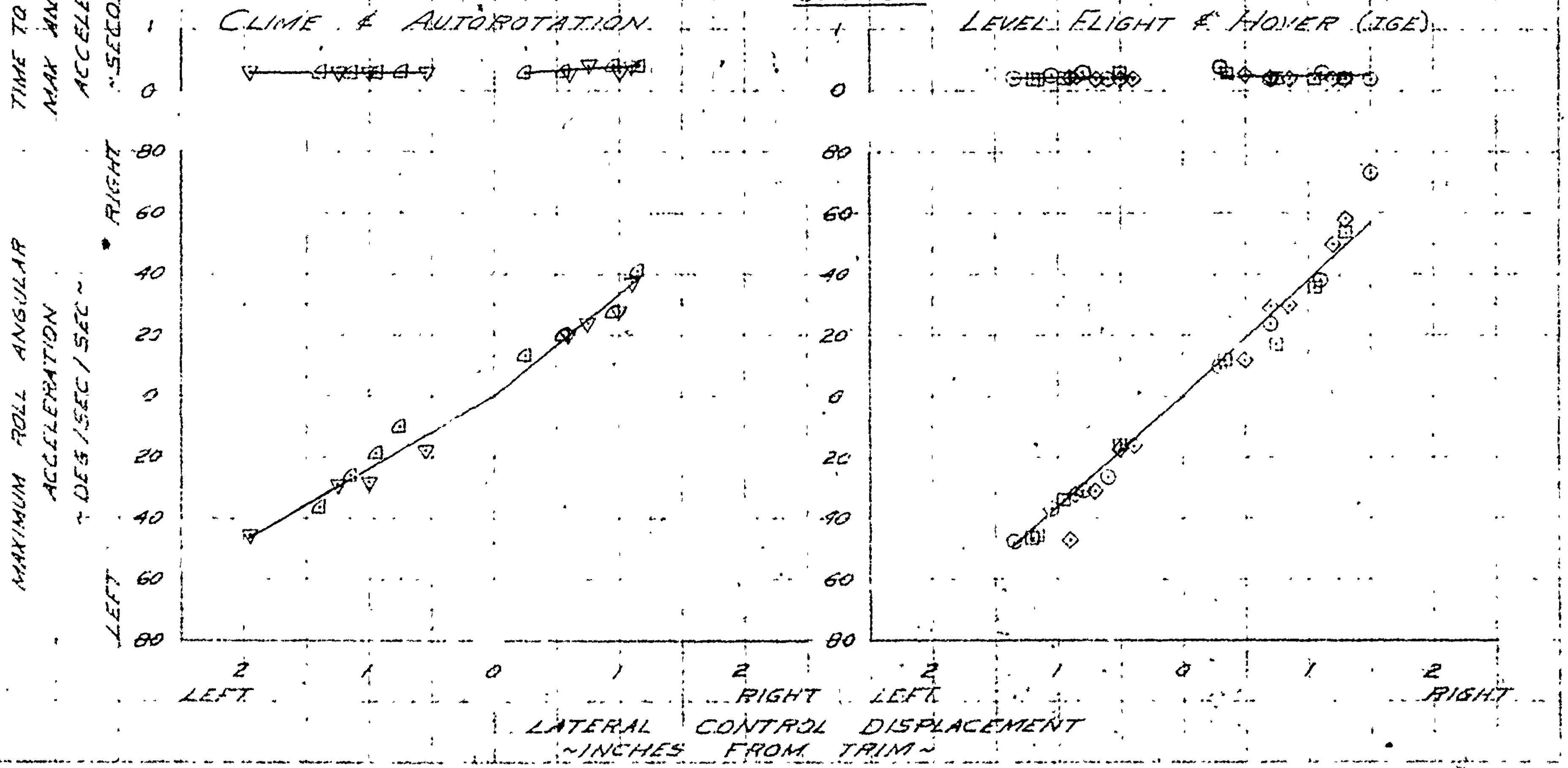


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FIGURE No. 142

LATERAL CONTROL SENSITIVITY

OH-5A USA S/N 62-4209

SYM	CAS ~KNOTS~	AVG. GW ~LB~	AVG. LONG. C.G. ~IN~	AVG. LAT. C.G. ~IN~	AVG. H_p ~FT~	ROTOR ~RPM~	CONFIGURATION	FLT. CONDITION
○	36	2580	101.3 (AFT)	0.2 LT	7000	368	CLEAN	LEVEL
□	78	2700	101.4 (AFT)	0.2 LT	6100	368	CLEAN	LEVEL
◇	48.5	2690	101.4 (AFT)	0.2 LT	5000	368	CLEAN	CLIMB
▽	56.5	2670	101.4 (AFT)	0.2 LT	5000	368	CLEAN	AUTO

SAS OFF

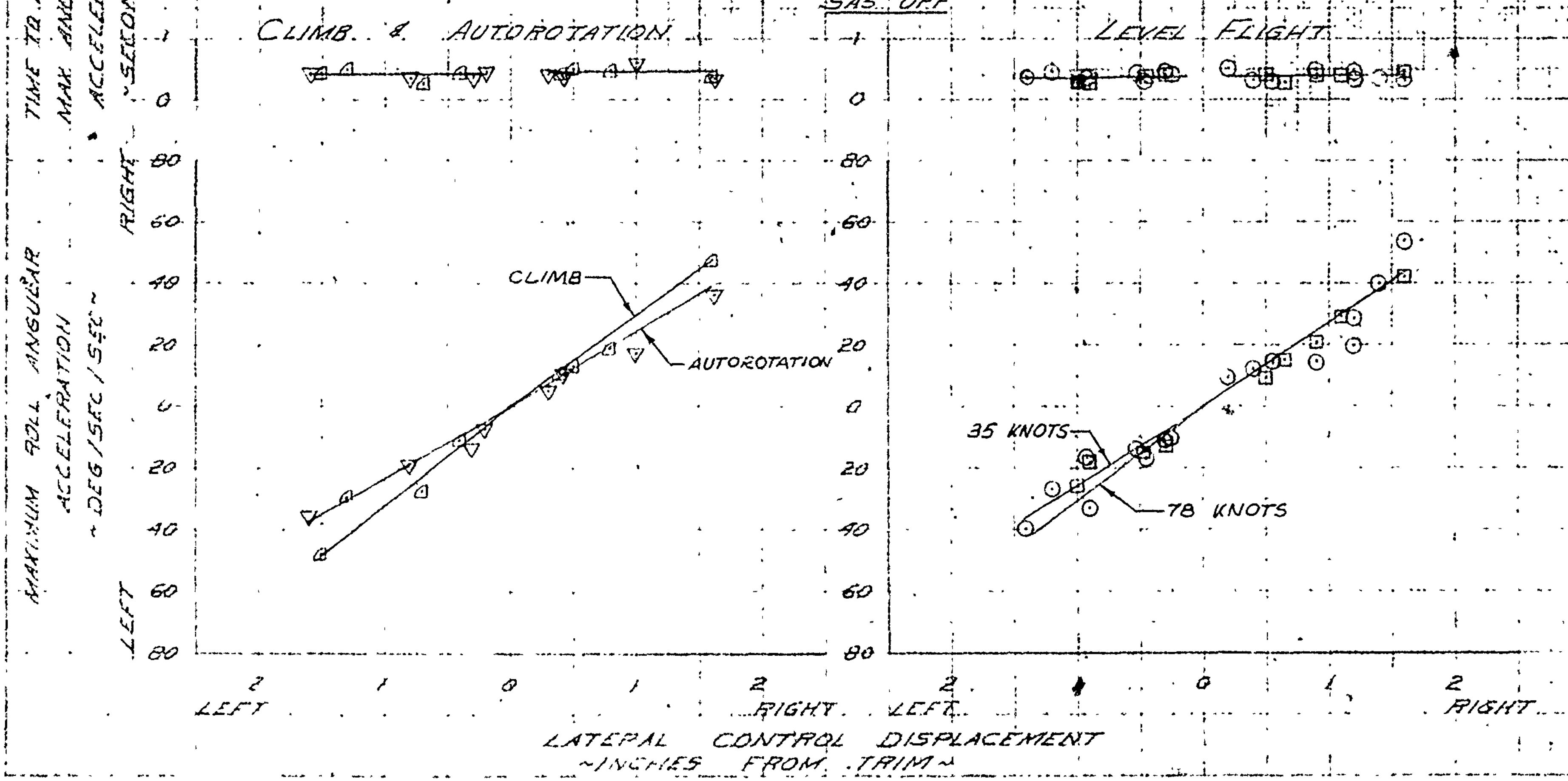

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FIGURE No. 143

LATERAL CONTROL SENSITIVITY

OH-5A USA S/N 62-4209

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG LONG CG ~IN~	AVG LAT CG ~IN~	AVG H_p ~FT~	ROTOR ~RPM~	CONFIGURATION	FLT CONDITION
○	35	2690	101.4 (AFT)	0.2 LT	9800	368	CLEAN	LEVEL
△	47.5	2710	101.4 (AFT)	0.2 LT	10000	368	CLEAN	CLIMB

SAS OFF

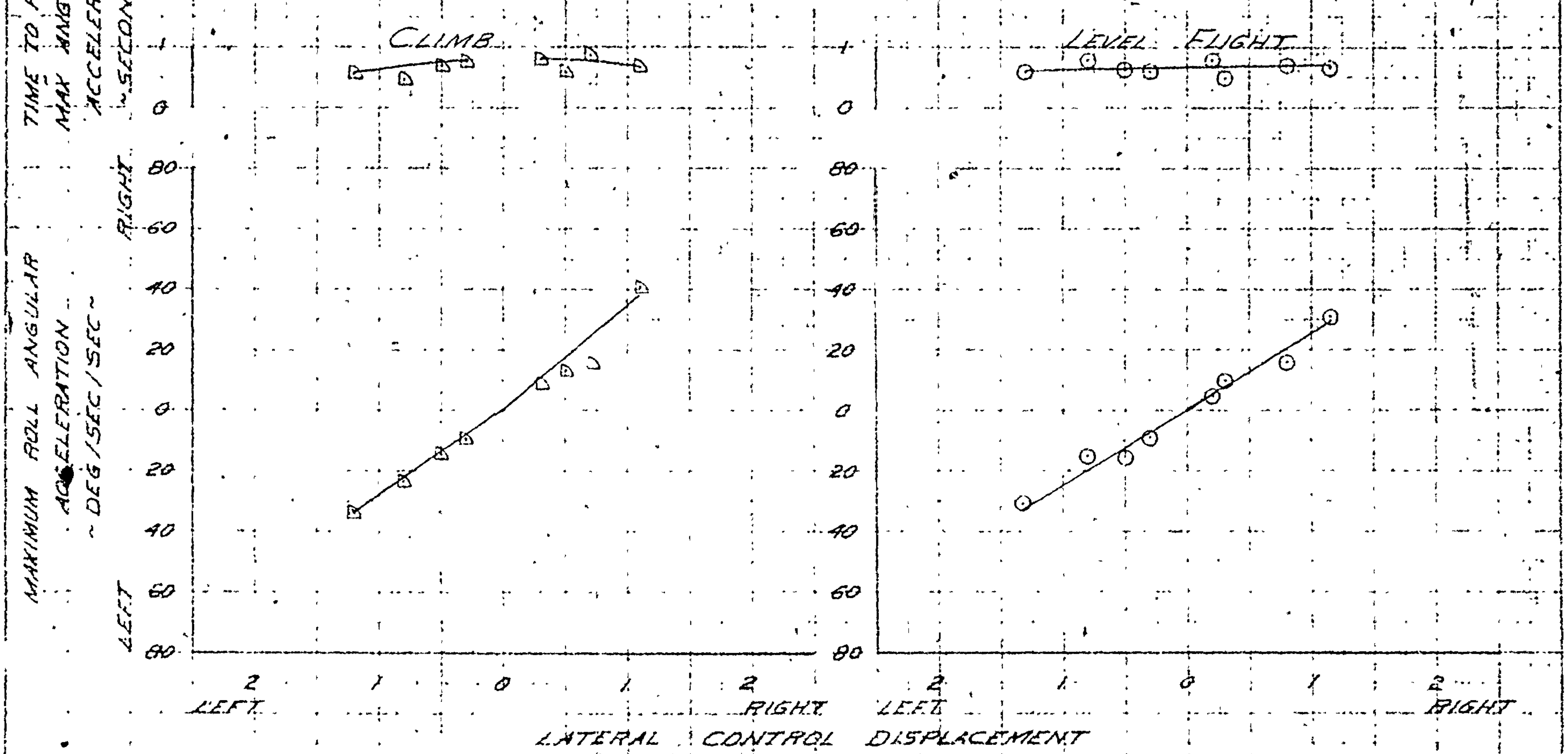


FIGURE NO. 144

SUMMARY OF LATERAL CONTROL RESPONSE

OH-5A USA S/N 62-4210

SYM	AVG H_p ~ FT	AVG G.W. ~ LB	AVG C.G. ~ IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT COND.
○	1600	2700	101.4(AFT)	0.2 LT	368	CLEAN	HOVER (IGE)
⊡	5100	2700	101.4(AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED
△	10000	2650	101.3(AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED

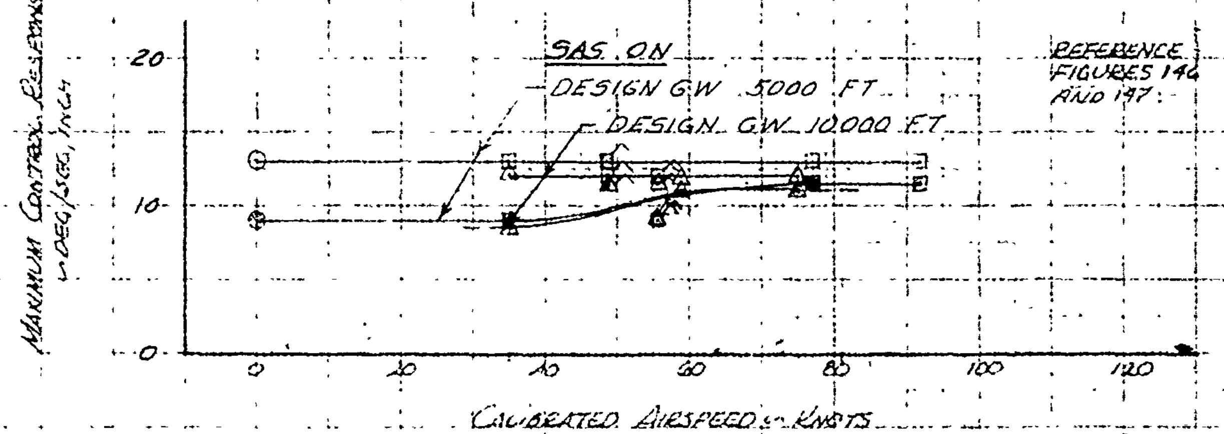
NOTE

1 SHADED SYMBOLS DENOTE LEFT ROLL

2 SINGLE FLAG ON SYMBOL DENOTES CLIMB

3 DOUBLE FLAG ON SYMBOL DENOTES AUTOROTATION

4 HALF SHADED SYMBOL DENOTES BOTH RIGHT ROLL AND LEFT ROLL



SYM	AVG H_p ~ FT	AVG G.W. ~ LB	AVG C.G. ~ IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT COND.
◇	1400	2690	95.6(FWD)	0.2 LT	368	CLEAN	HOVER (IGE)
⬭	4900	2700	95.4(FWD)	0.2 LT	368	CLEAN	LEVEL & NOTED
□	5000	2970	95.6(FWD)	0.2 LT	368	CLEAN	LEVEL & NOTED

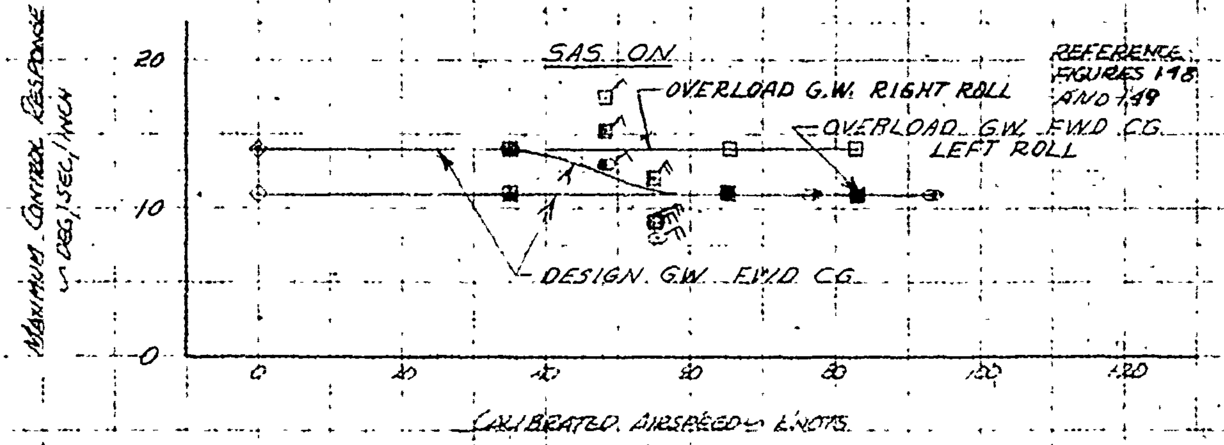


FIGURE NO. 145

SUMMARY OF LATERAL CONTROL RESPONSE

OH-5A USA S/N 62-4210

SYM	AVG H_p ~ FT	AVG G.W ~ LB	AVG C.G ~ IN LONG	AVG C.G ~ IN LAT	ROTOR RPM	CONFIGURATION	FLT COND.
○	4900	2640	101.1 (AFT)	1.1 LT	368	XM-7	LEVEL & NOTED
◇	1500	2700	101.2 (AFT)	0.3 RT	368	XM-8	HOVER (IGE)
□	4900	2690	101.2 (AFT)	0.3 RT	368	XM-8	LEVEL & NOTED

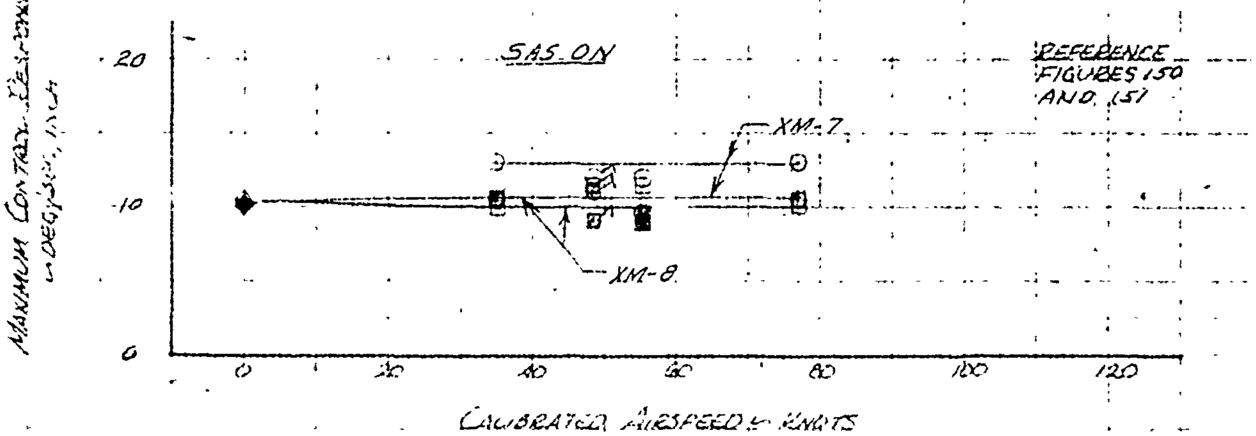
NOTE

1 SHADED SYMBOLS DENOTE LEFT ROLL

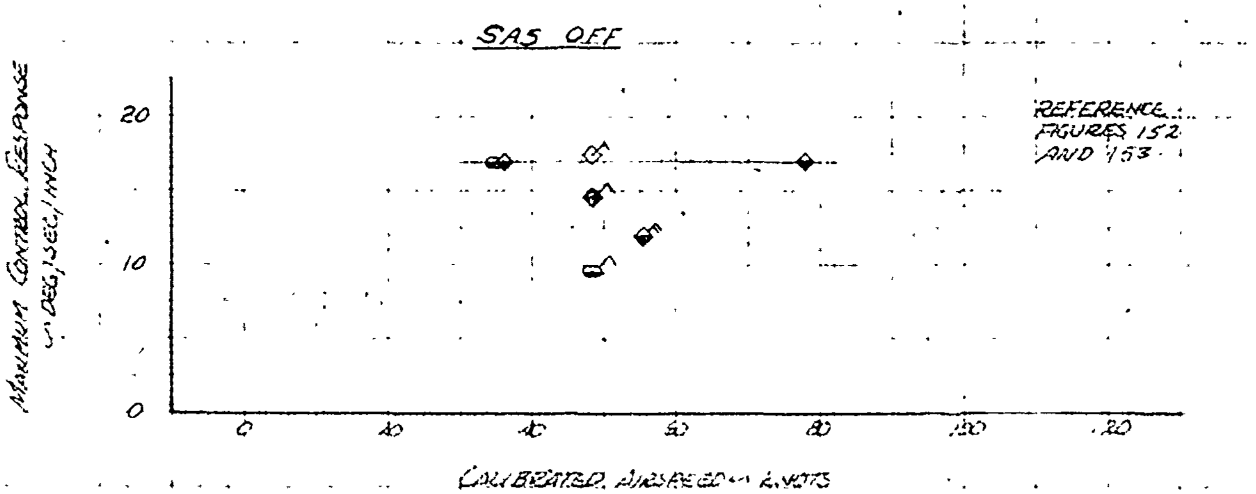
2 SINGLE FLAG ON SYMBOL DENOTES CLIMB

3 DOUBLE FLAG ON SYMBOL DENOTES AUTOROTATION

4 HALF SHADED SYMBOL DENOTES BOTH RIGHT ROLL AND LEFT ROLL



SYM	AVG H_p ~ FT	AVG G.W ~ LB	AVG C.G ~ IN LONG	AVG C.G ~ IN LAT	ROTOR RPM	CONFIGURATION	FLT COND.
◇	5800	2660	101.4 (AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED
⬭	9900	2700	101.4 (AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED



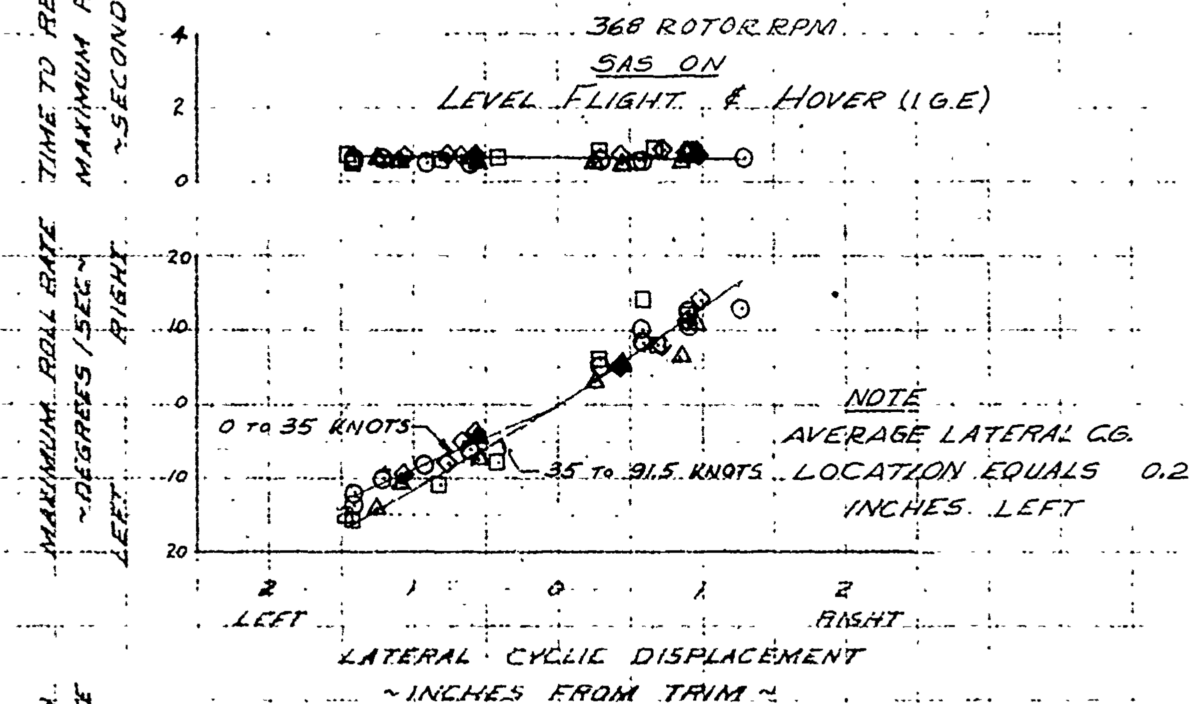
ONLY

FIGURE NO. 146

LATERAL CONTROL RESPONSE

OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG. G.W. ~LB~	AVG. C.G. ~IN~	AVG H_o ~FT	CONFIGURATION	FLT COND
○	35	2725	101.4 (AFT)	5100	CLEAN	LEVEL
□	77	2680	101.4 (AFT)	5200	CLEAN	LEVEL
△	91.5	2680	101.4 (AFT)	5500	CLEAN	LEVEL
◇	0	2700	101.4 (AFT)	1600	CLEAN	HOVER (IGE)
⊿	48.5	2710	101.4 (AFT)	5000	CLEAN	CLIMB
▽	55.5	2700	101.4 (AFT)	5000	CLEAN	AUTO



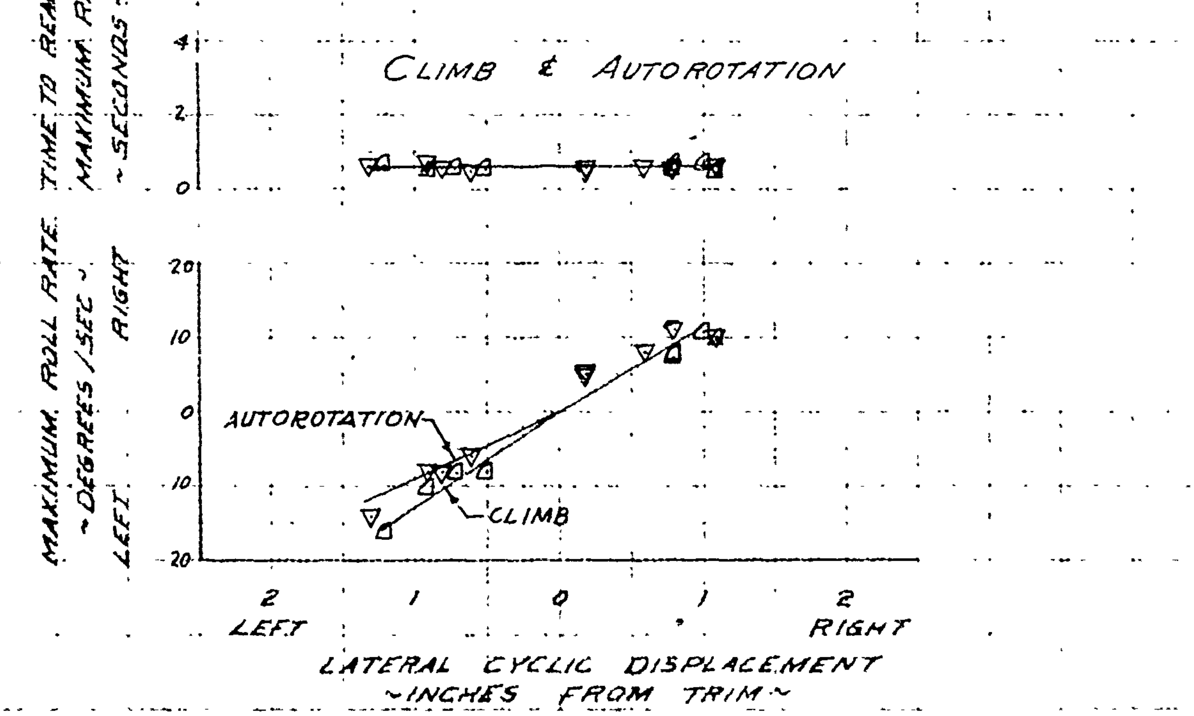
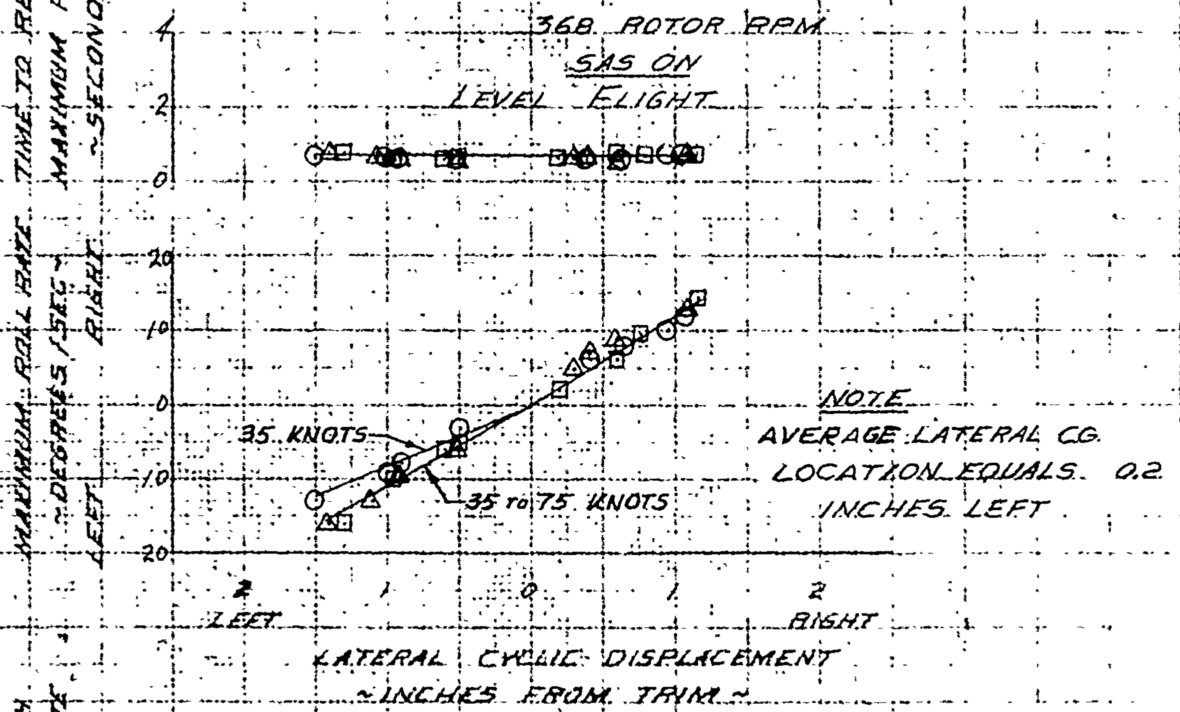


FIGURE NO. 147

LATERAL CONTROL RESPONSE

OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG CG ~IN~	AVG H_o ~FT	CONFIGURATION & FLT CONDITION	
○	35	2700	101.3 (AFT)	10,100	CLEAN	LEVEL
□	59	2640	101.3 (AFT)	10,100	CLEAN	LEVEL
△	75	2650	101.3 (AFT)	10,200	CLEAN	LEVEL
◺	48.5	2590	101.3 (AFT)	10,000	CLEAN	CLIMB
▽	55.5	2570	101.2 (AFT)	10,000	CLEAN	AUTO



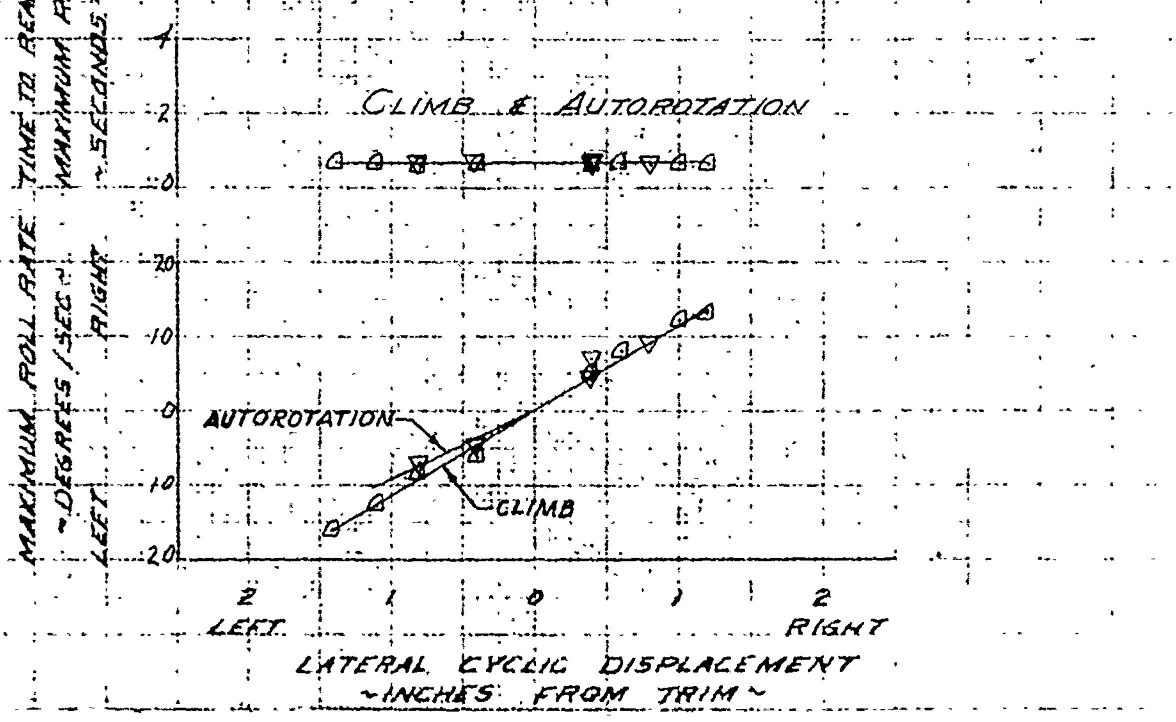


FIGURE NO. 148

LATERAL CONTROL RESPONSE

OH-5A USA S/N 62-4210 (HOVER 62-4209)

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG CG ~IN~	AVG H_o ~FT	CONFIGURATION & FLT CONDITION	
○	35	2740	95.5 (FWD)	4900	CLEAN	LEVEL
□	77	2720	95.5 (FWD)	4900	CLEAN	LEVEL
△	93.5	2680	95.4 (FWD)	4900	CLEAN	LEVEL
◭	48.5	2690	95.4 (FWD)	5000	CLEAN	CLIMB
▽	55.5	2610	95.3 (FWD)	5000	CLEAN	AUTO
◇	0	2690	95.6 (FWD)	1400	CLEAN	HOVER (IGE)

368 ROTOR RPM

SAS ON

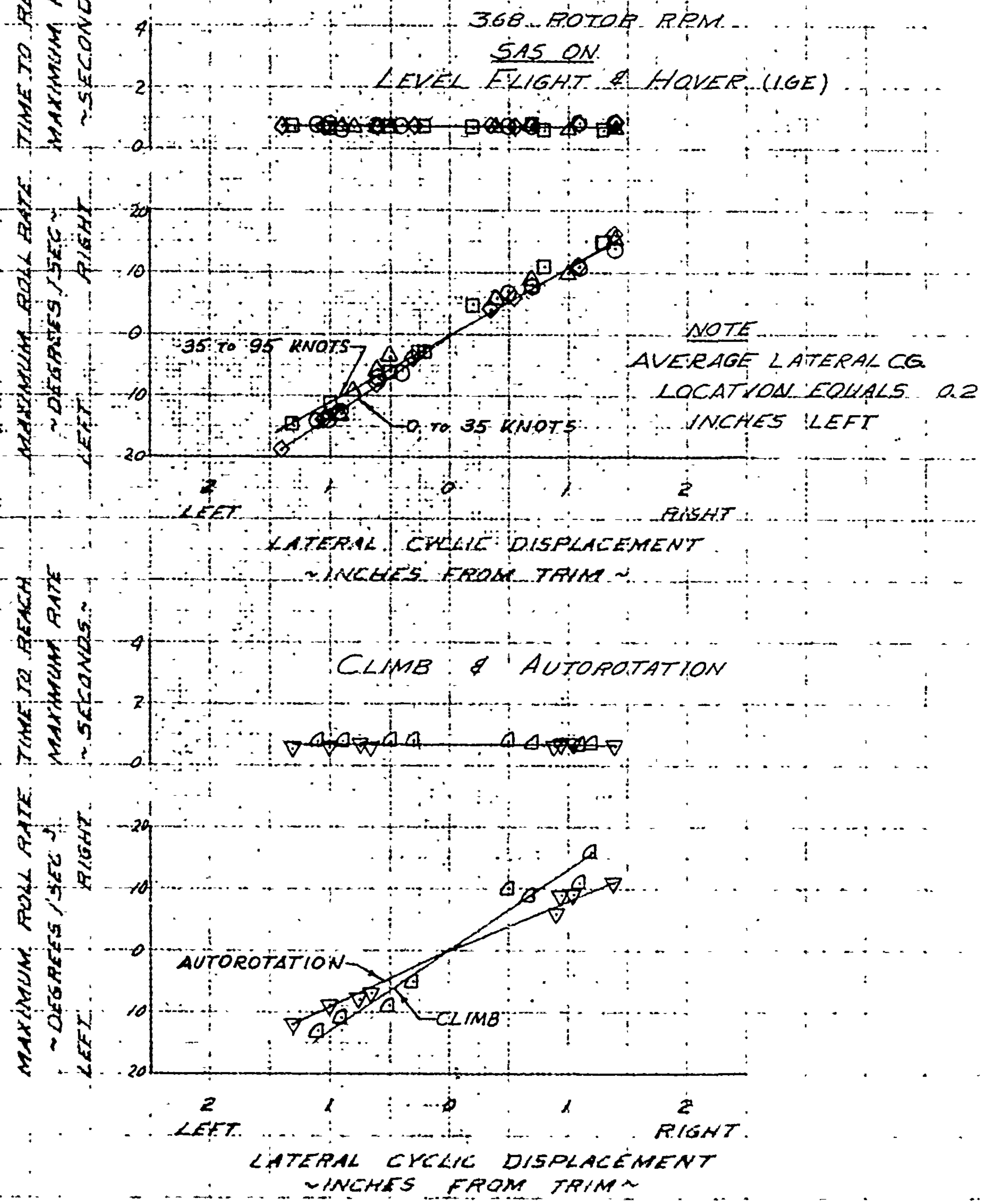
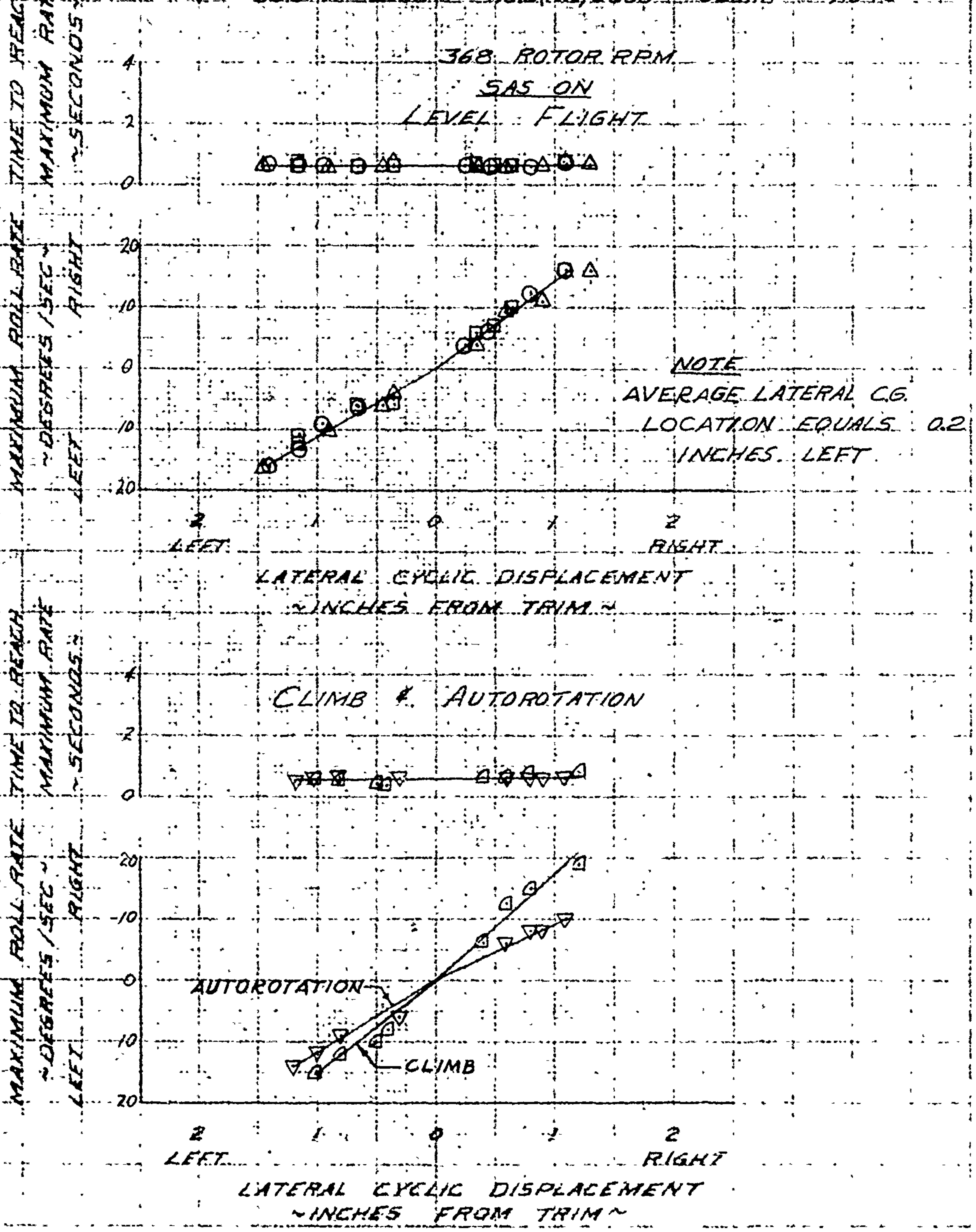


FIGURE NO. 149

LATERAL CONTROL RESPONSE

OH-6A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG CG ~IN~	AVG H_p ~FT	CONFIGURATION	& FLT CONDITION
○	35	3020	95.7 (FWD)	5000	CLEAN	LEVEL
⊡	65.5	2980	95.6 (FWD)	5100	CLEAN	LEVEL
△	83	2930	95.5 (FWD)	5100	CLEAN	LEVEL
◬	48.5	2960	95.6 (FWD)	5000	CLEAN	CLIMB
▽	55.5	2950	95.6 (FWD)	5000	CLEAN	AUTO



NOTE
AVERAGE LATERAL C.G. LOCATION EQUALS 0.2 INCHES LEFT

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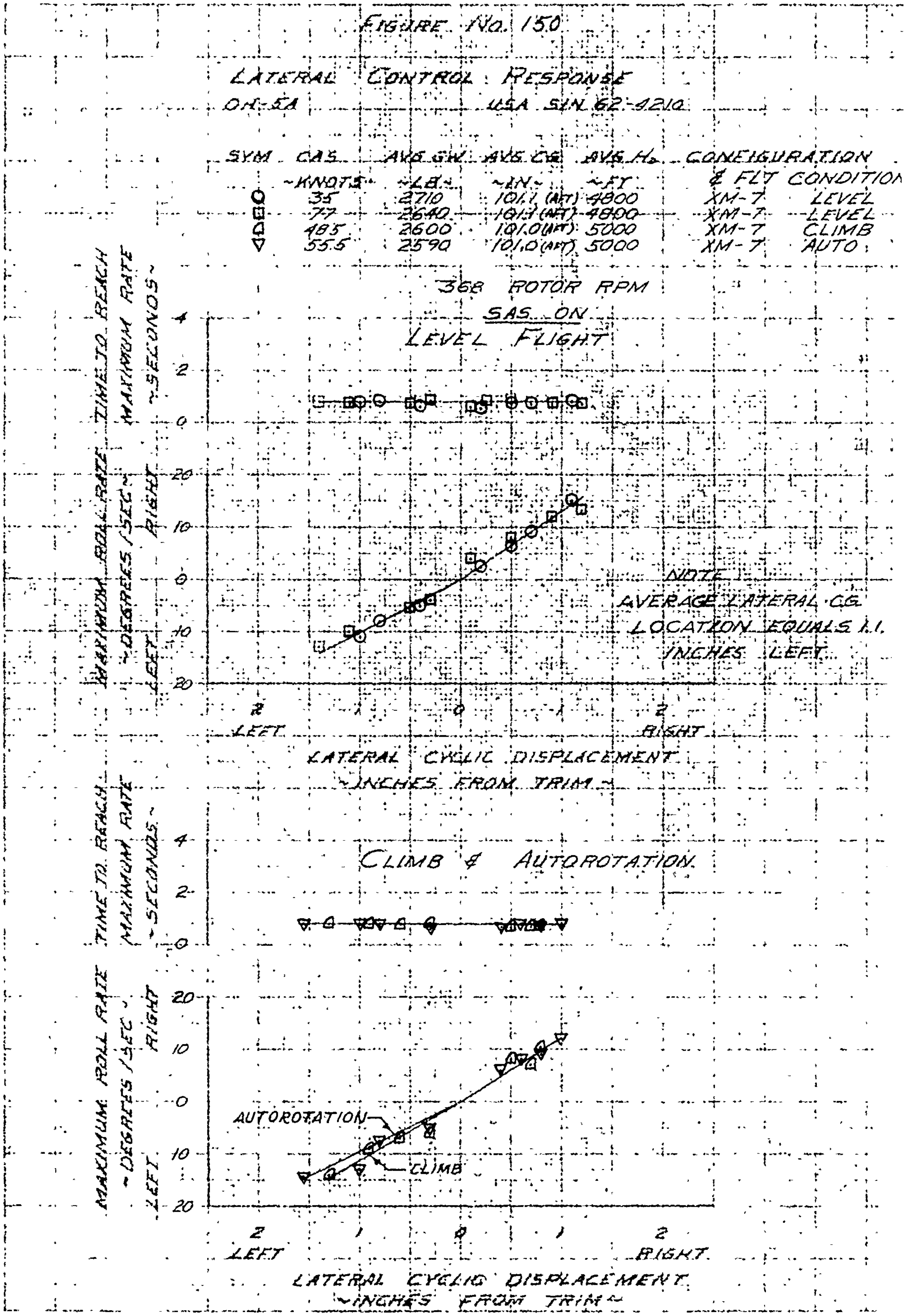

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FIGURE NO. 151

LATERAL CONTROL RESPONSE

OH-6A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG CG ~IN~	AVG H_p ~FT~	CONFIGURATION & FLT CONDITION	
○	35	2710	101.2 (AFT)	4800	XM-8	LEVEL
□	77	2560	101.2 (AFT)	4900	XM-8	LEVEL
◇	0	2700	101.2 (AFT)	1500	XM-8	HOVER (IGE)
△	48.5	2700	101.2 (AFT)	5000	XM-8	CLIMB
▽	55.6	2680	101.2 (AFT)	5000	XM-8	AUTO

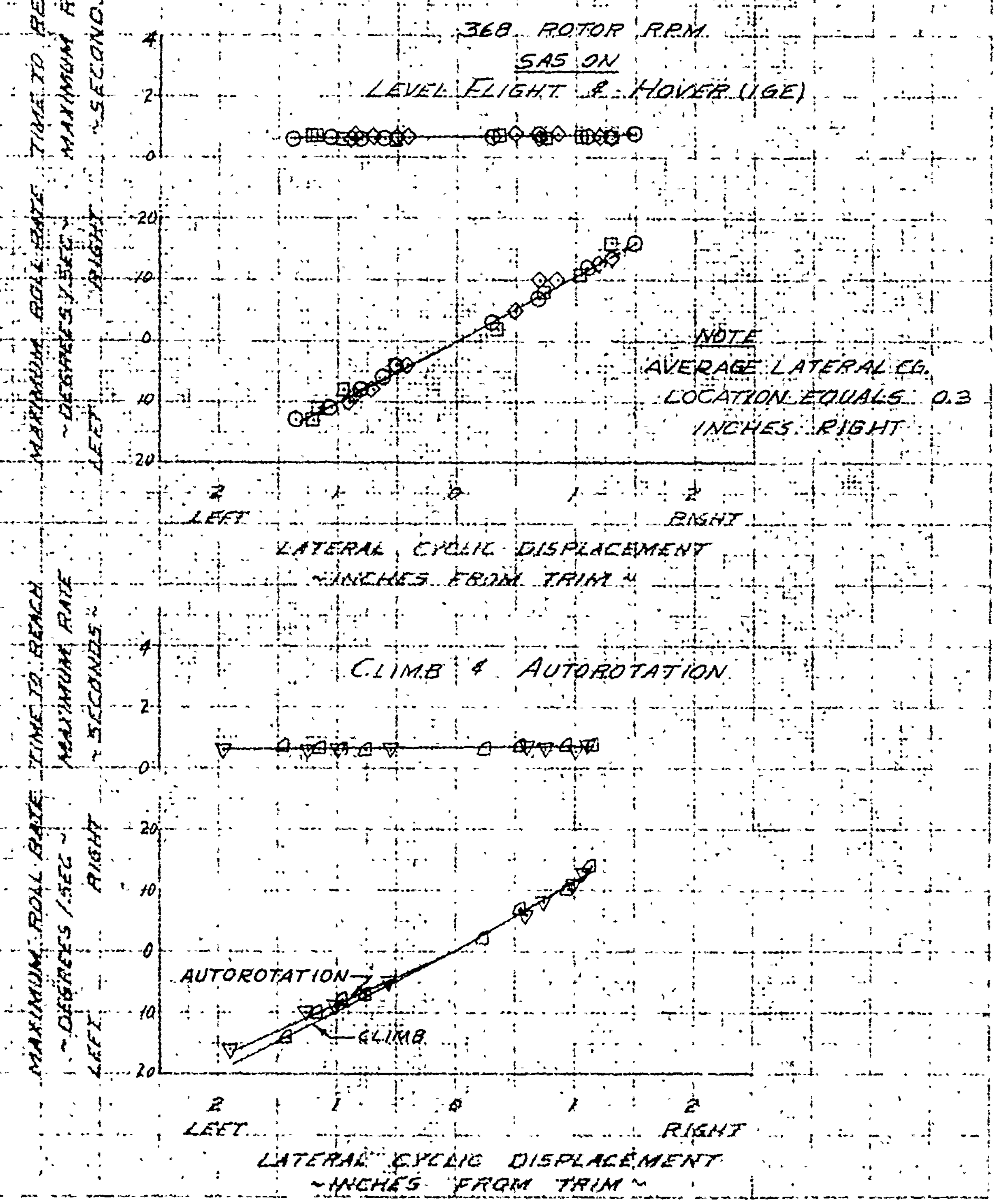

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FIGURE No. 152

LATERAL CONTROL RESPONSE

OH-6A USA S/N 62-4209

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG CG ~IN~	AVG H_P ~FT	CONFIGURATION & FLT CONDITION	
○	36	2580	101.3 (AFT)	7000	CLEAN	LEVEL
⊡	78	2700	101.4 (AFT)	6100	CLEAN	LEVEL
△	48.5	2690	101.4 (AFT)	5000	CLEAN	CLIMB
▽	56.5	2670	101.4 (AFT)	5000	CLEAN	AUTO

368 ROTOR RPM

SAS OFF

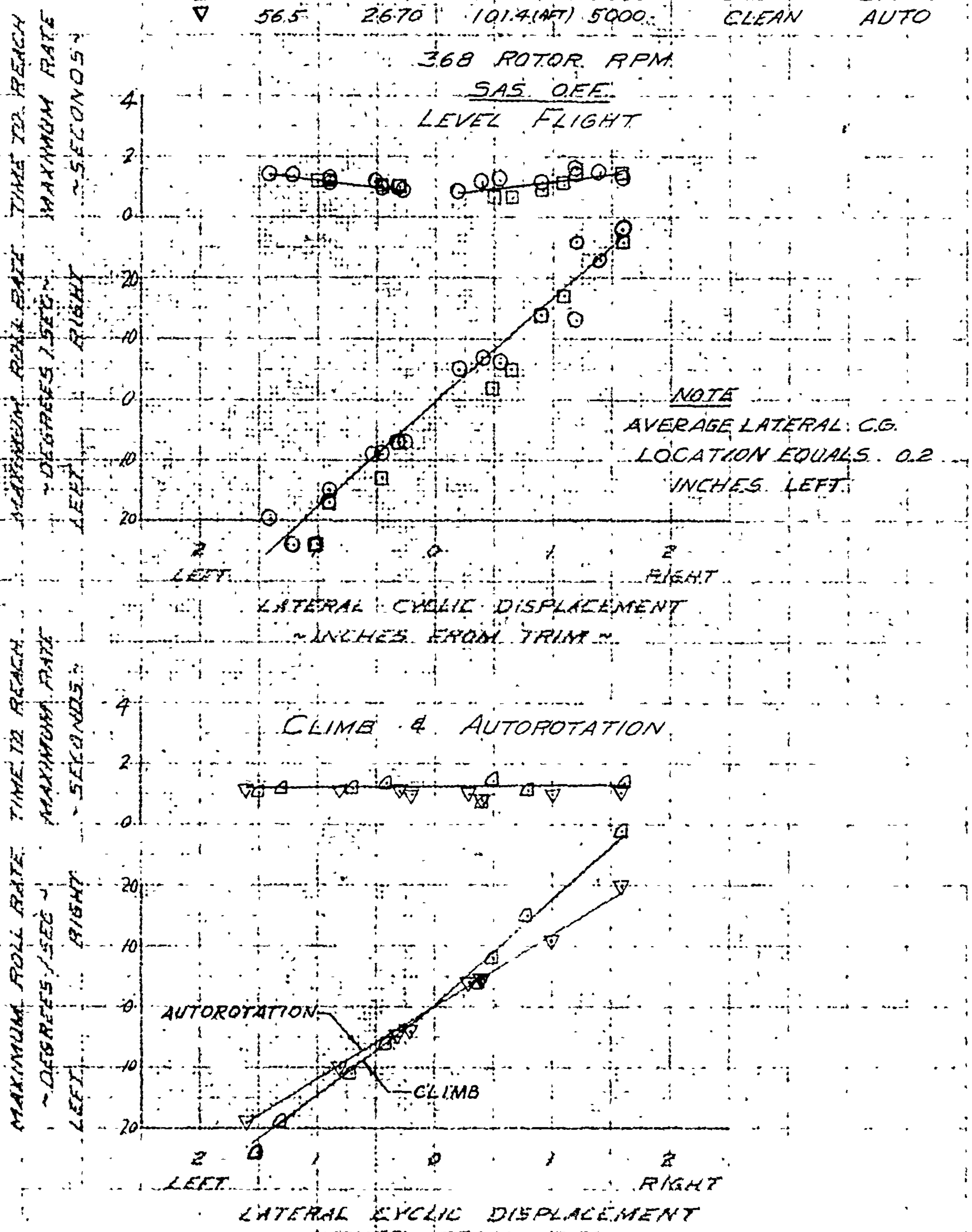

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FIGURE No 153

LATERAL CONTROL RESPONSE

OH-6A USA S/N 62-4209

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG CG ~IN~	AVG H_p ~FT	CONFIGURATION & FLT CONDITION	
○	35	2690	101.4 (AFT)	9800	CLEAN	LEVEL
△	47.5	2710	101.4 (AFT)	10000	CLEAN	CLIMB

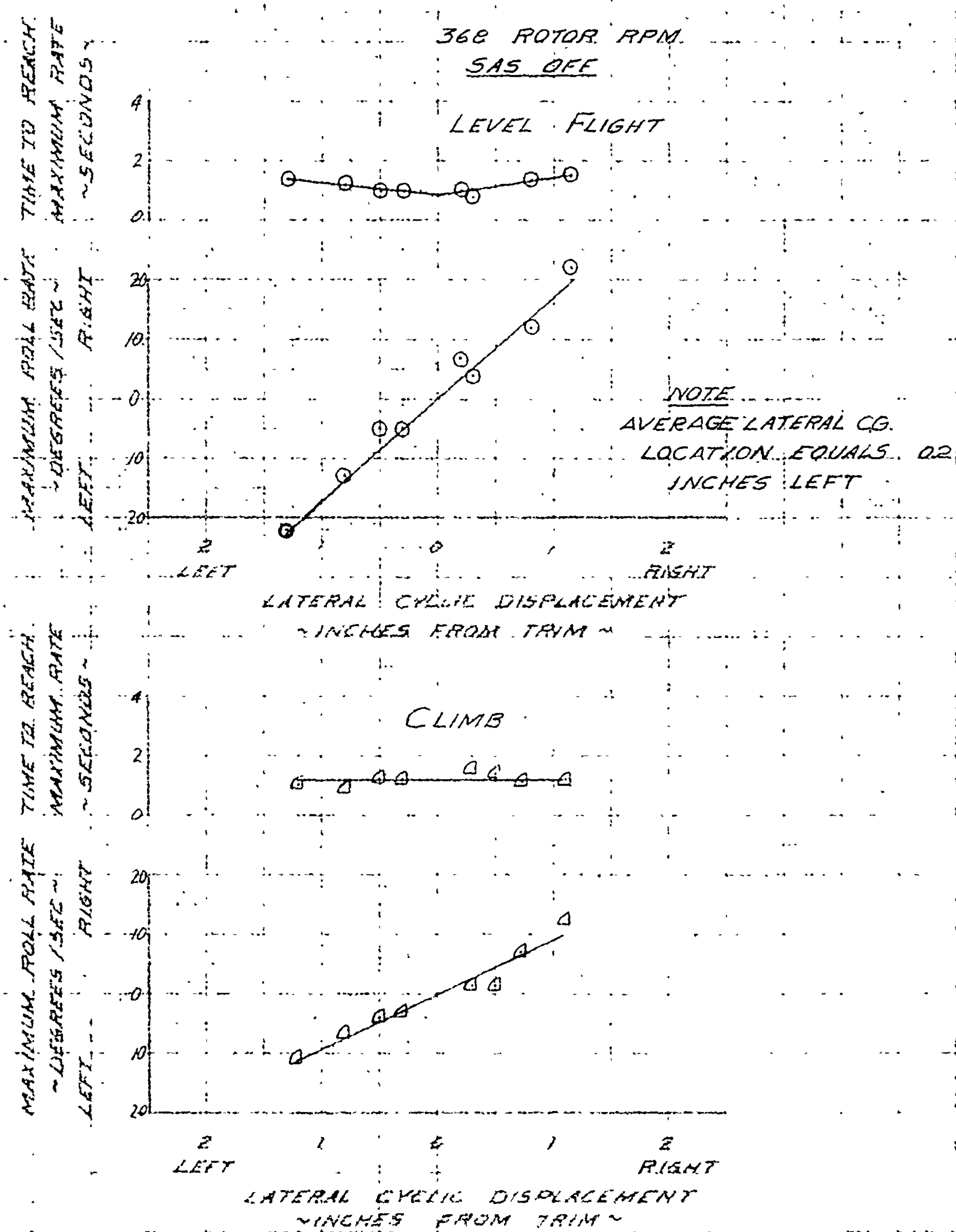


FIGURE No. 154

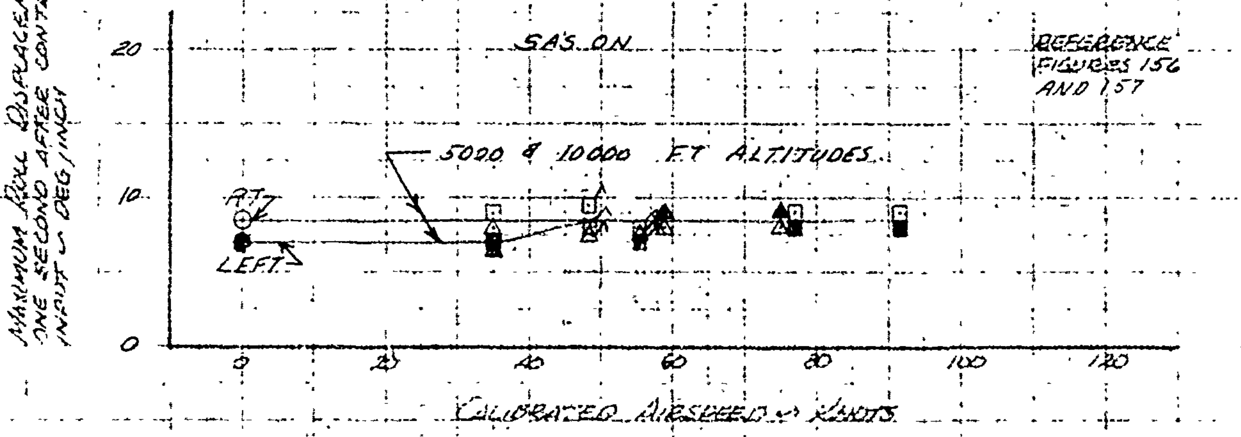
SUMMARY OF ANGULAR ROLL DISPLACEMENT

OH-5A USA S/N 62-4210

SYM	AVG H_o ~ FT	AVG G.W ~ LB	AVG C.G. ~ IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT COND
⊙	1600	2700	101.4(AFT)	0.2 LT	368	CLEAN	HOVER (IGE)
⊡	5100	2700	101.4(AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED
△	10000	2650	101.4(AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED

NOTE

1. SHADED SYMBOLS DENOTE LEFT ROLL
2. SINGLE FLAG ON SYMBOL DENOTES CLIMB
3. DOUBLE FLAG ON SYMBOL DENOTES AUTOROTATION
4. HALF SHADED SYMBOL DENOTES BOTH RIGHT ROLL AND LEFT ROLL



SYM	AVG. H_p ~ FT	AVG G.W ~ LB	AVG C.G. ~ IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT. COND
◇	1400	2690	95.6(FWD)	0.2 LT	368	CLEAN	HOVER (IGE)
○	4900	2700	95.4(FWD)	0.2 LT	368	CLEAN	LEVEL & NOTED
□	5000	2970	95.6(FWD)	0.2 LT	368	CLEAN	LEVEL & NOTED

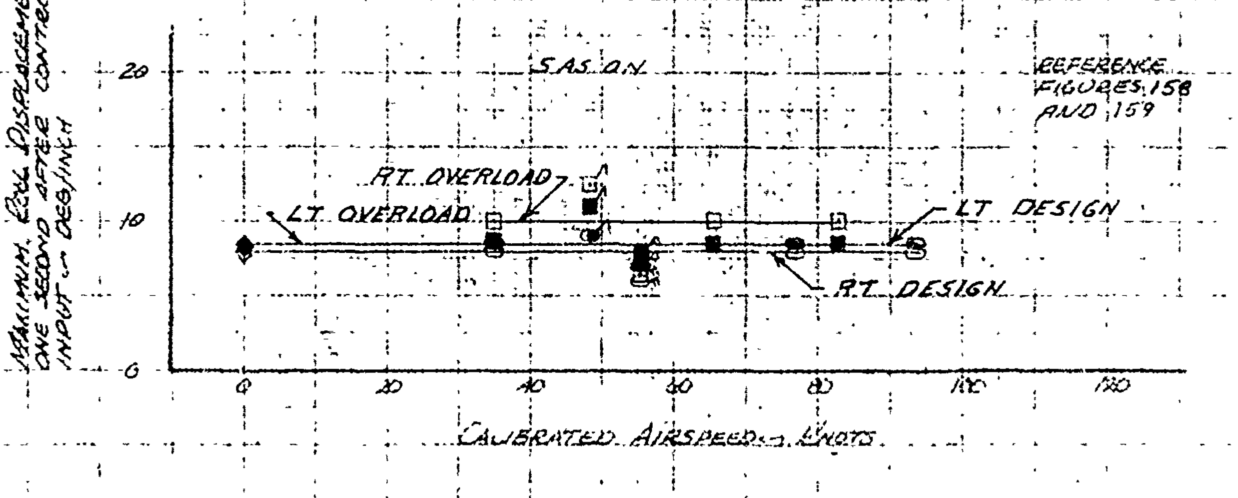


FIGURE NO. 155

SUMMARY OF ANGULAR ROLL DISPLACEMENT

OH-5A: USA S/N 62-4210 (62-4209 SAS OFF)

SYM	AVG H_p ~ FT	AVG G.W ~ LB	AVG C.G ~ IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT. COND
○	4900	2640	101.1 (AFT)	1.1 LT	368	XM-7	LEVEL & NOTED
◇	1500	2700	101.2 (AFT)	0.3 RT	368	XM-8	HOVER (IGE)
□	4900	2690	101.2 (AFT)	0.3 RT	368	XM-8	LEVEL & NOTED

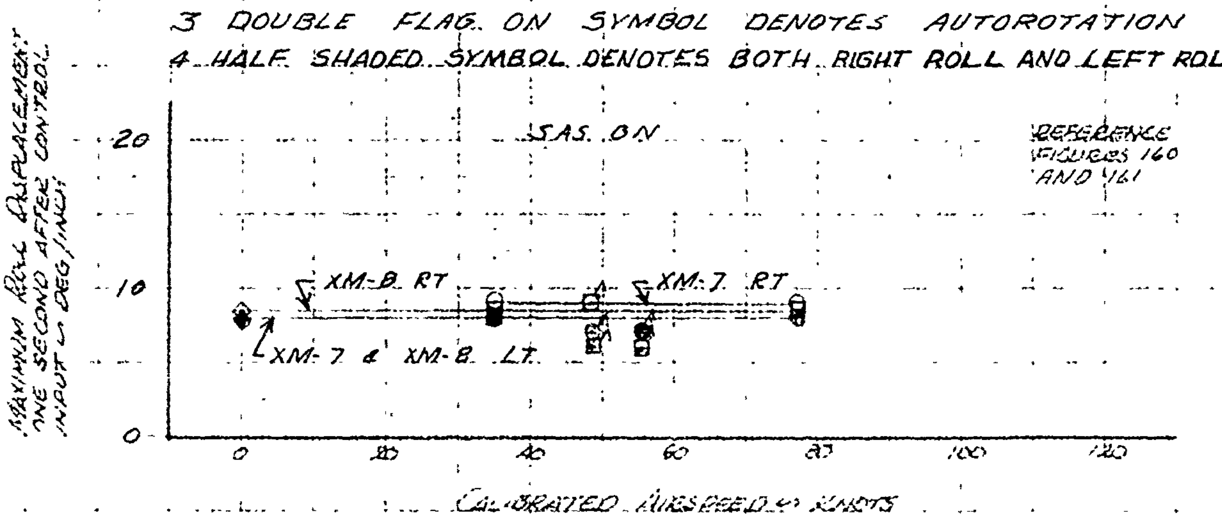
NOTE

1 SHADED SYMBOLS DENOTE LEFT ROLL

2 SINGLE FLAG ON SYMBOL DENOTES CLIMB

3 DOUBLE FLAG ON SYMBOL DENOTES AUTOROTATION

4 HALF SHADED SYMBOL DENOTES BOTH RIGHT ROLL AND LEFT ROLL



SYM	AVG H_p ~ FT	AVG G.W ~ LB	AVG C.G ~ IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT. COND.
◇	5800	2660	101.4 (AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED
⊖	9900	2760	101.4 (AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED

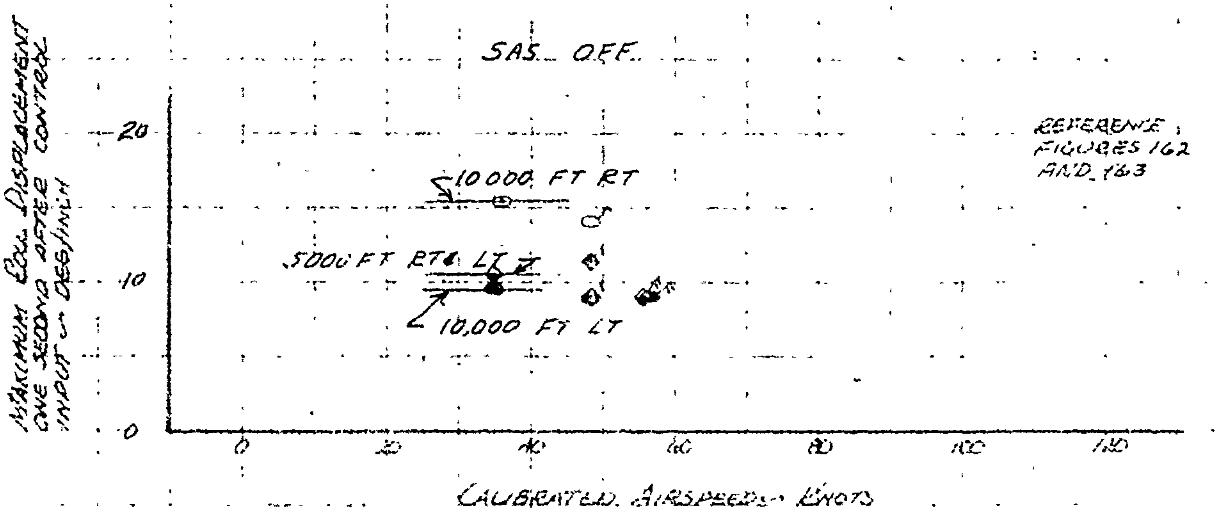


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FIGURE NO. 156

ANGULAR ROLL DISPLACEMENT

OH-5A . USA S/N. 62-4210

SYM.	CAS ~KNOTS~	AVG GW ~LB~	AVG CG ~IN.~	AVG H_P ~FT~	CONFIGURATION	FLT COND
○	35	2725	101.4 (AFT)	5100	CLEAN	LEVEL
□	77	2680	101.4 (AFT)	5200	CLEAN	LEVEL
△	91.5	2680	101.4 (AFT)	5500	CLEAN	LEVEL
◇	0	2700	101.4 (AFT)	1600	CLEAN	HOVER (IGE)
⌂	48.5	2710	101.4 (AFT)	5000	CLEAN	CLIMB
▽	55.5	2700	101.4 (AFT)	5000	CLEAN	AUTO

368 ROTOR RPM.

SAS ON

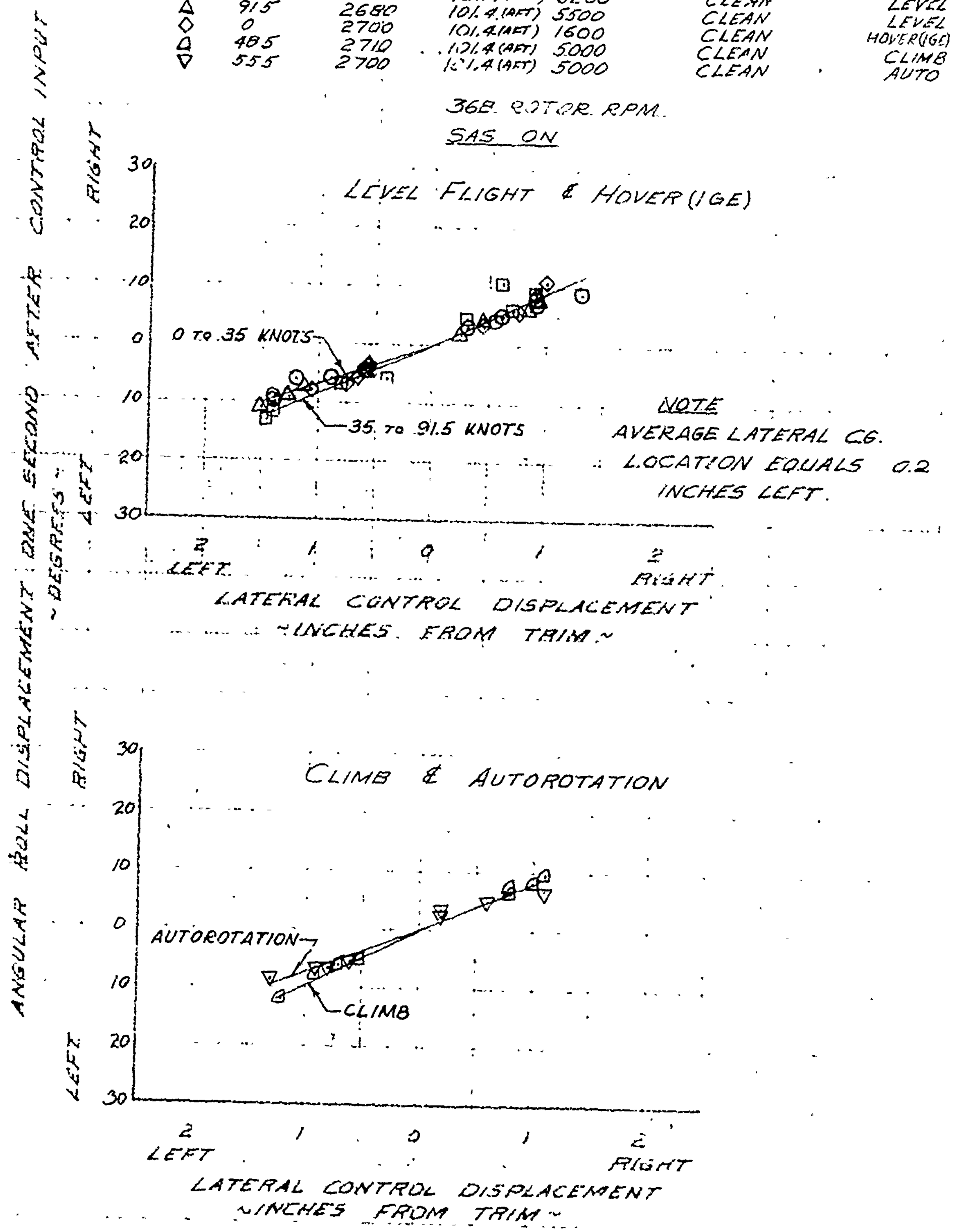

FIGURE No. 157

ANGULAR ROLL DISPLACEMENT

OH-5A USA S/N 62-4210

SYM.	CAS ~KNOTS~	AVG. G.W. ~LB~	AVG. C.G. ~IN	AVG H_D ~FT~	CONFIGURATION & FLT	CONDITION
○	35	2700	101.3 (AFT)	10100	CLEAN	LEVEL
□	59	2640	101.3 (AFT)	10100	CLEAN	LEVEL
△	75	2650	101.3 (AFT)	10200	CLEAN	LEVEL
◬	48.5	2590	101.3 (AFT)	10000	CLEAN	CLIMB
▽	55.5	2570	101.2 (AFT)	10000	CLEAN	AUTO

368 ROTOR RPM

SAS ON

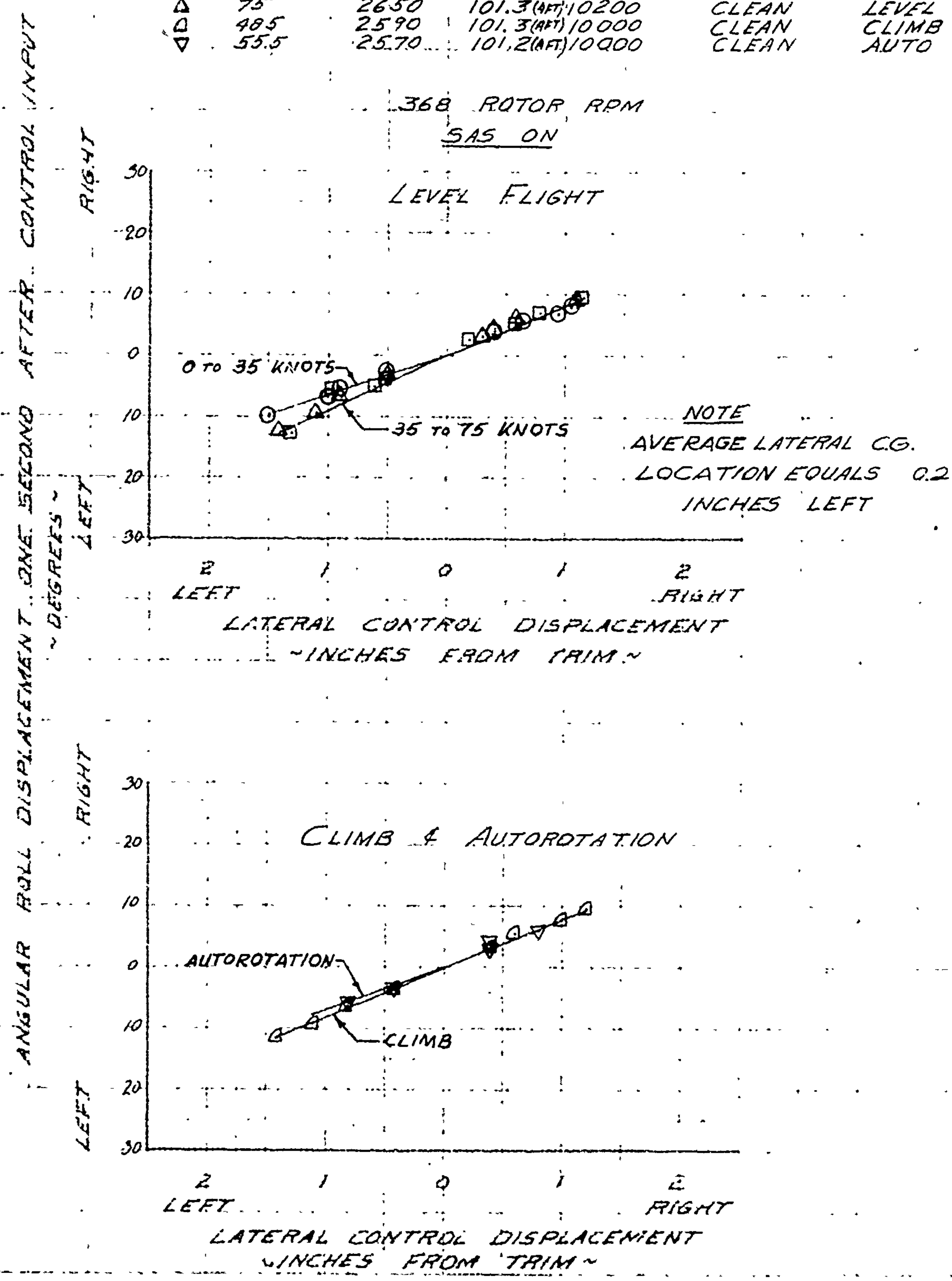

FIGURE No. 158

ANGULAR ROLL DISPLACEMENT

OH-5A USA S/N 62-4210 (HOVER 62-4209)

SYM	CAS ~KNOTS~	AVG G.W. ~LB~	AVG CG ~IN~	AVG H_D ~FT~	CONFIGURATION & FLT CONDITION	
○	35	2740	95.5 (FWD)	4900	CLEAN	LEVEL
□	77	2720	95.5 (FWD)	4900	CLEAN	LEVEL
△	93.5	2680	95.4 (FWD)	4900	CLEAN	LEVEL
◻	48.5	2690	95.4 (FWD)	5000	CLEAN	CLIMB
▽	55.5	2610	95.3 (FWD)	5000	CLEAN	AUTO
◇	0	2690	95.6 (FWD)	1400	CLEAN	HOVER (IGE)

368 ROTOR RPM

SAS ON

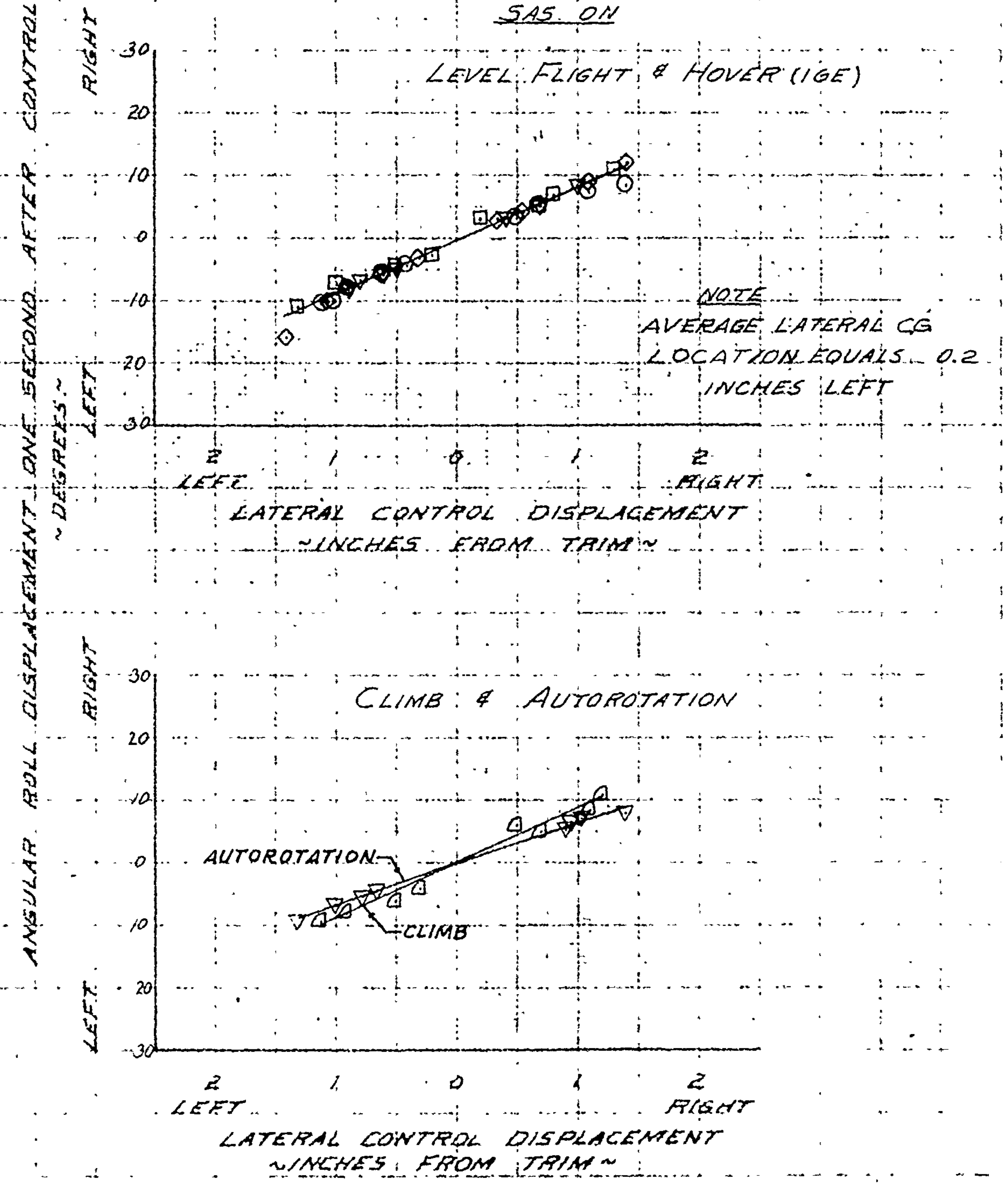

Figure No. 159

Angular Roll Displacement

OH-5A USA S/N 62-4210

SYM.	CAS ~KNOTS~	AVG GW ~LB~	AVG CG ~IN~	AVG H_p ~FT~	CONFIGURATION & FLT CONDITION	
○	35	3020	95.7 (FWD)	5000	CLEAN	LEVEL
□	65.5	2980	95.6 (FWD)	5100	CLEAN	LEVEL
△	83	2930	95.5 (FWD)	5100	CLEAN	LEVEL
◺	48.5	2960	95.6 (FWD)	5000	CLEAN	CLIMB
▽	55.5	2950	95.6 (FWD)	5000	CLEAN	AUTO

368 ROTOR RPM

SAS ON

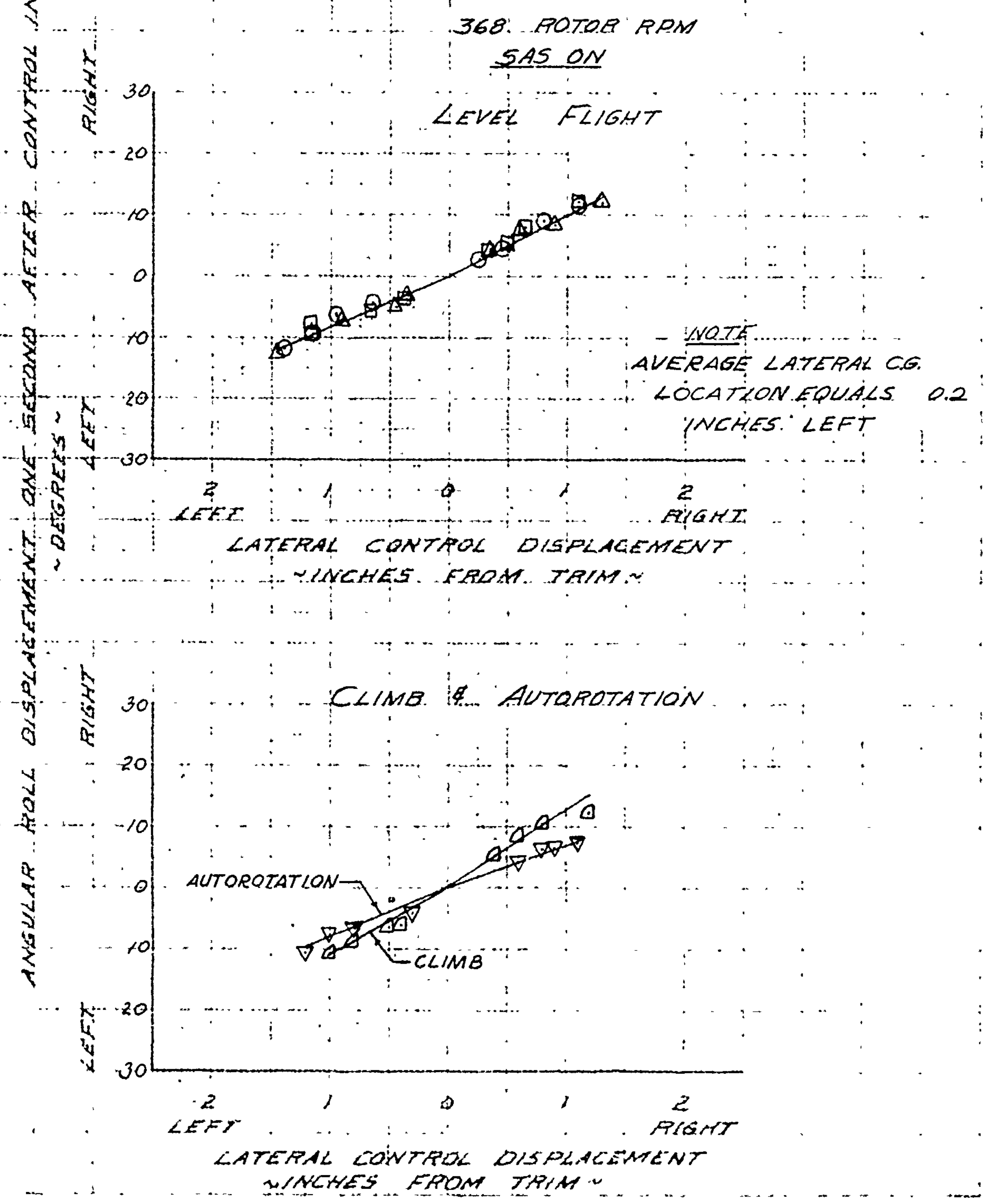

FIGURE No. 160

ANGULAR ROLL DISPLACEMENT

OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG CG ~IN~	AVG H_p ~FT~	CONFIGURATION & FLT CONDITION	
○	35	2710	101.1 (AFT)	4800	XM-7	LEVEL
□	77	2640	101.4 (AFT)	4800	XM-7	LEVEL
△	48.5	2600	101.0 (AFT)	5000	XM-7	CLIMB
▽	55.5	2590	101.0 (AFT)	5000	XM-7	AUTO

368 ROTOR RPM.

SAS ON

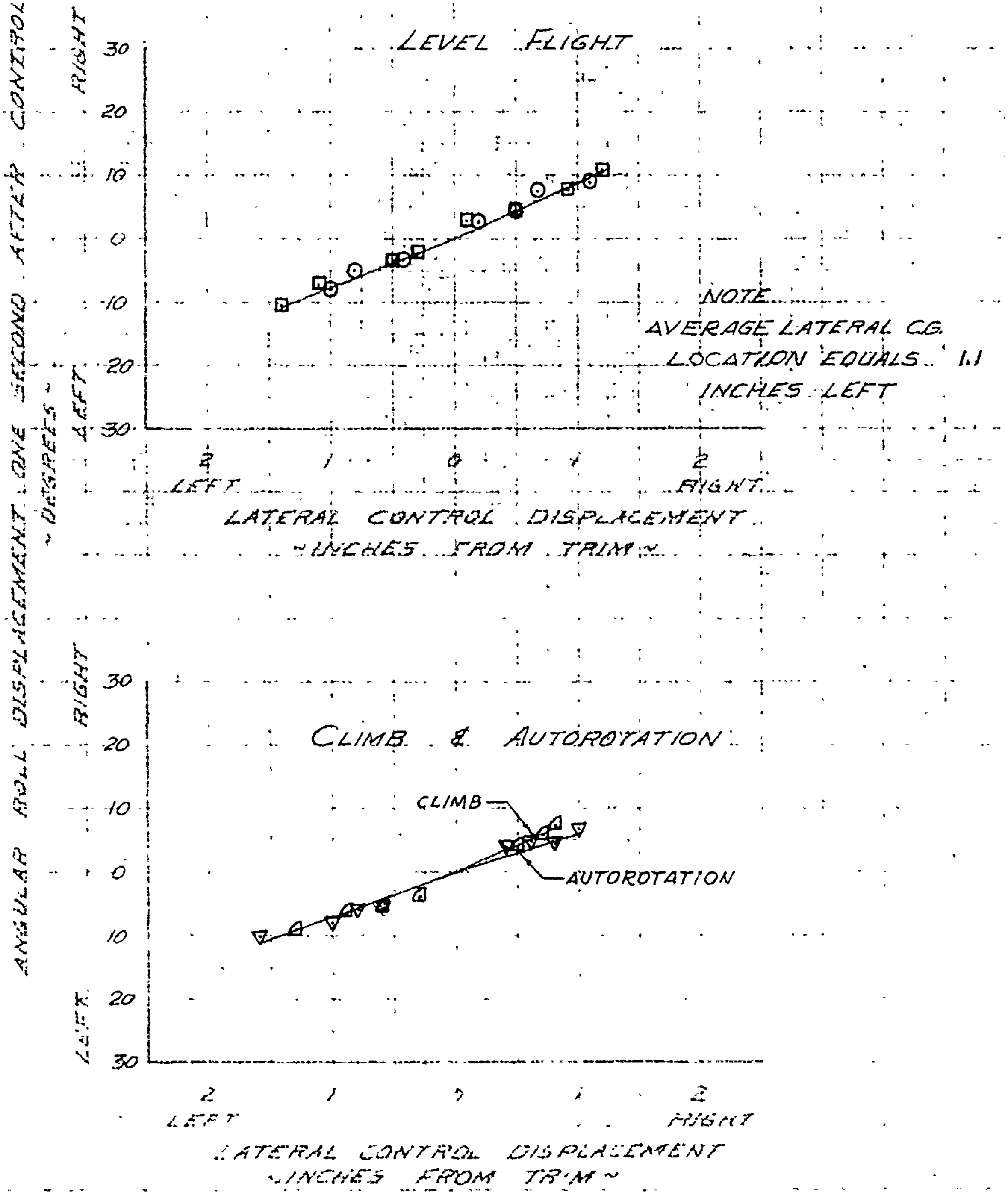

FIGURE No. 161

ANGULAR ROLL DISPLACEMENT

OH-5A USA S/N 62-4210

SYM.	CAS ~KNOTS~	AVG. GW. ~LB~	AVG. CG ~IN~	AVG. H_p ~FT~	CONFIGURATION & FLT CONDITION	
○	35	2710	101.2 (AFT)	4800	XM-8	LEVEL
⊡	77	2660	101.2 (AFT)	4900	XM-8	LEVEL
◇	0	2700	101.2 (AFT)	1500	XM-8	HOVER (IGE)
◻	48.5	2700	101.2 (AFT)	5000	XM-8	CLIMB
▽	55.5	2680	101.2 (AFT)	5000	XM-8	AUTO

368 ROTOR RPM

SAS ON

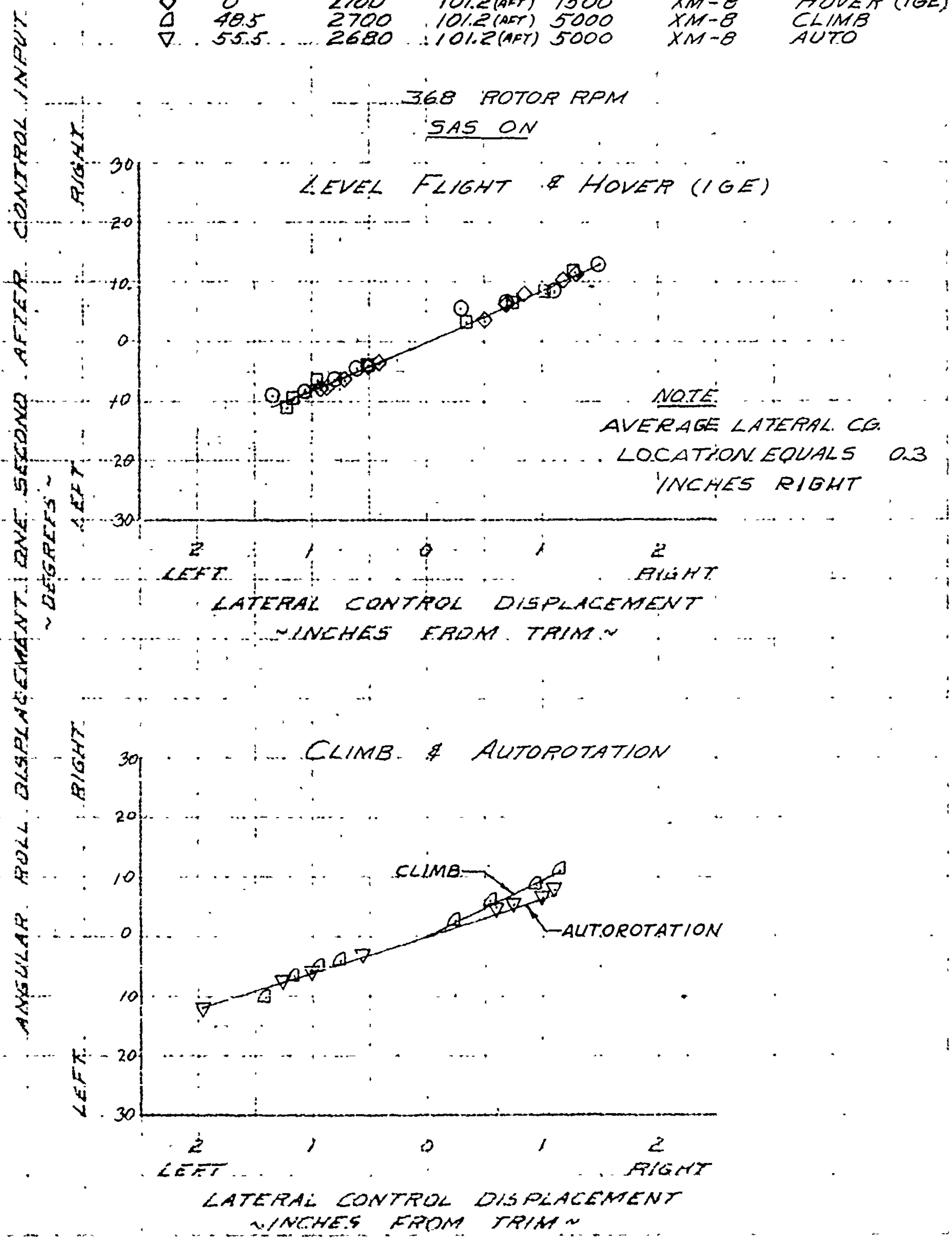

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FIGURE No. 162

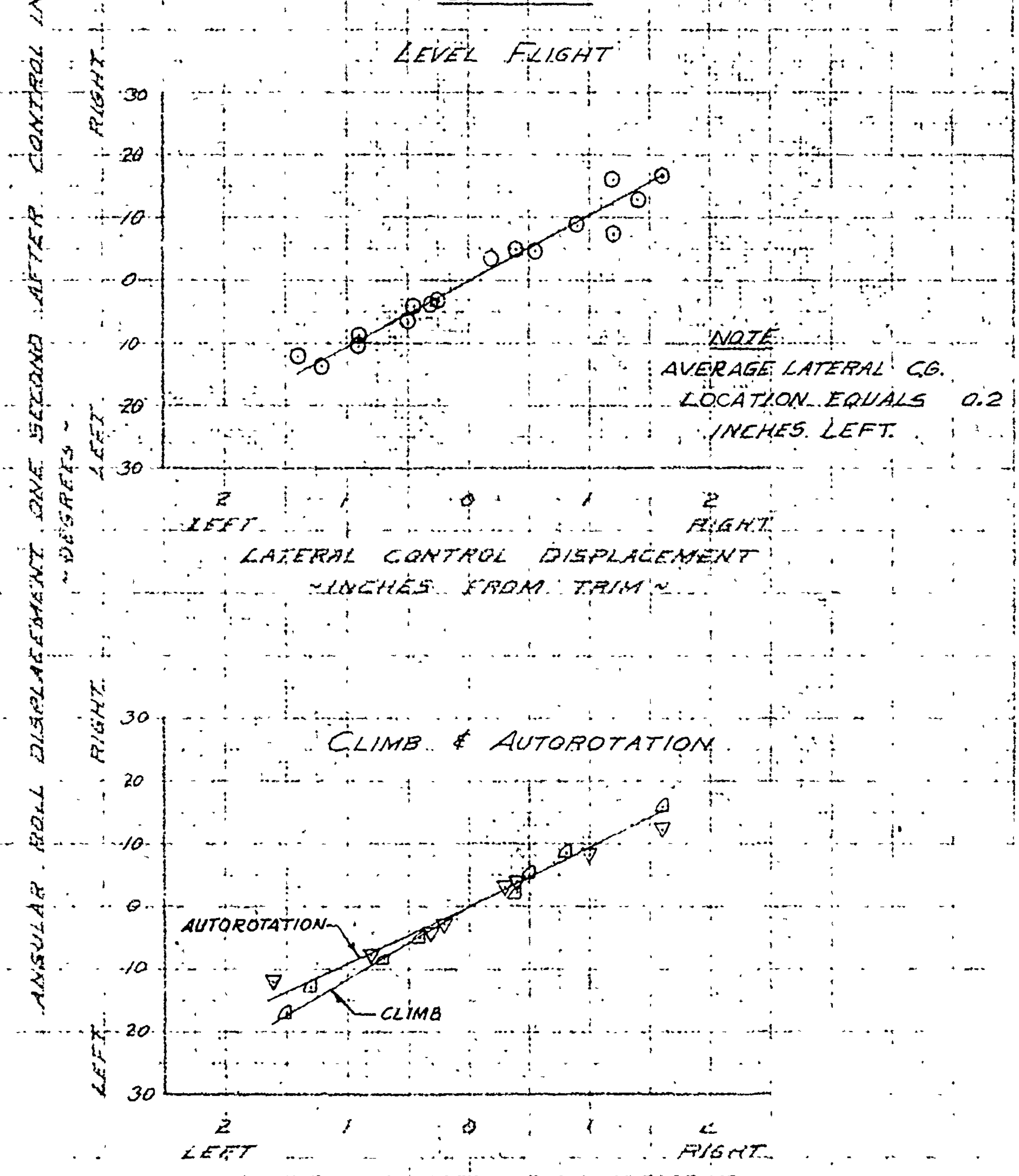
ANGULAR ROLL DISPLACEMENT

OH-5A USA S/N 62-4209

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG CG ~IN~	AVG H_D ~FT~	CONFIGURATION	& FLT CONDITION
○	36	2580	101.3 (AFT)	7000	CLEAN	LEVEL
△	48.5	2690	101.4 (AFT)	5000	CLEAN	CLIMB
▽	56.5	2670	101.4 (AFT)	5000	CLEAN	AUTO

368 ROTOR RPM

SAS OFF



FOR OFFICIAL USE ONLY

FIGURE NO. 163

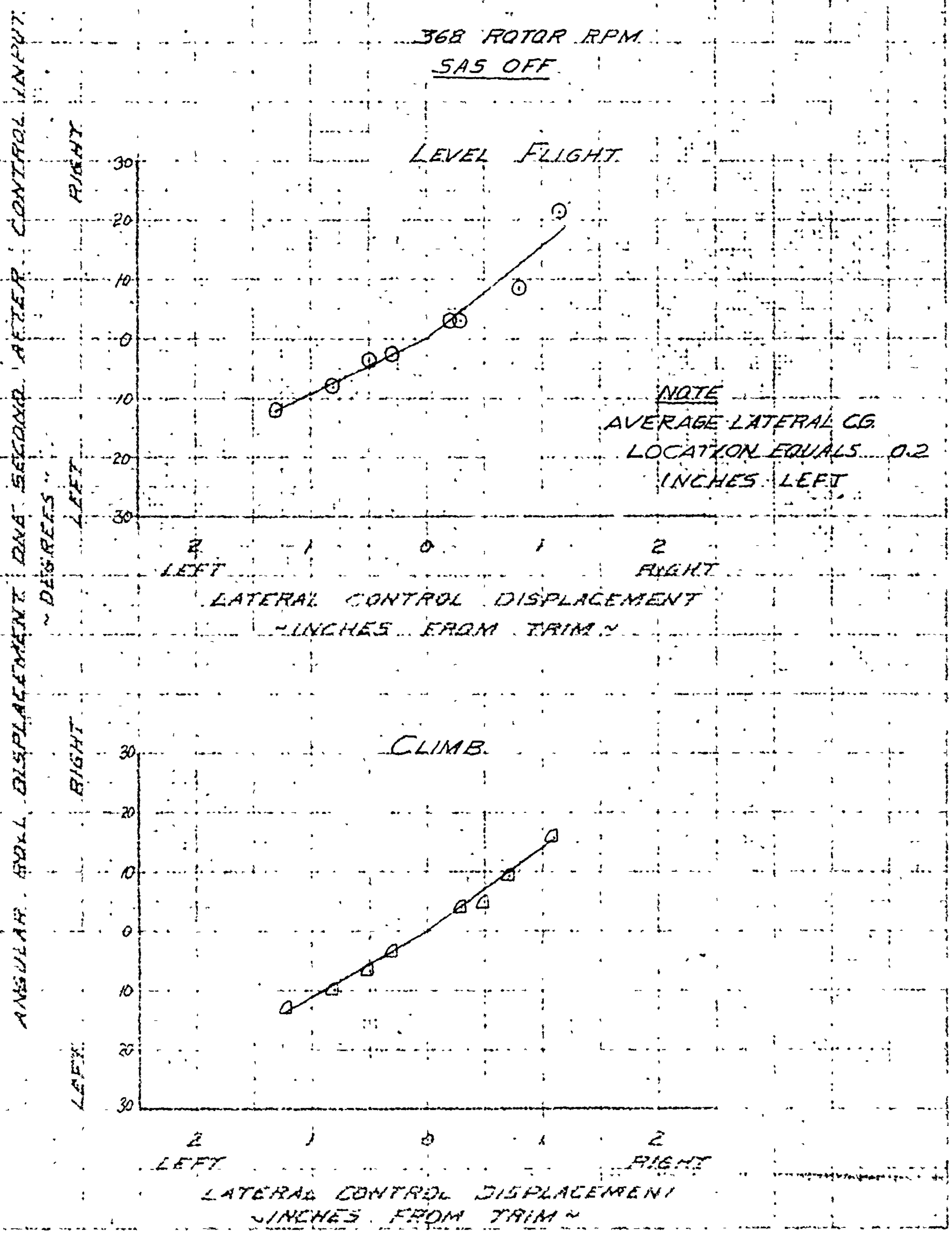
ANGULAR ROLL DISPLACEMENT

OH-6A USA S/N 62-4209

SYM.	CAS ~KNOTS~	AVG. G.W. ~LB~	AVG. CG ~IN~	AVG H_p ~FT~	CONFIGURATION	& FLT. CONDITION
⊙	35	2690	101.4 (AFT)	9800	CLEAN	LEVEL
△	47.5	2710	101.4 (AFT)	10000	CLEAN	CLIMB

368 ROTOR RPM

SAS OFF



FOR OFFICIAL USE ONLY

FIGURE No. 164

SUMMARY OF DIRECTIONAL CONTROL SENSITIVITY

CH-5A USA S/N 62-4210

SYM	AVG Hp ~ FT	AVG GW ~ LB	AVG CG ~ IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT COND
○	1600	2660	101.3 (AFT)	0.2 LT	368	CLEAN	HOVER (IGE)
□	5300	2640	101.2 (AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED
△	10000	2610	101.2 (AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED

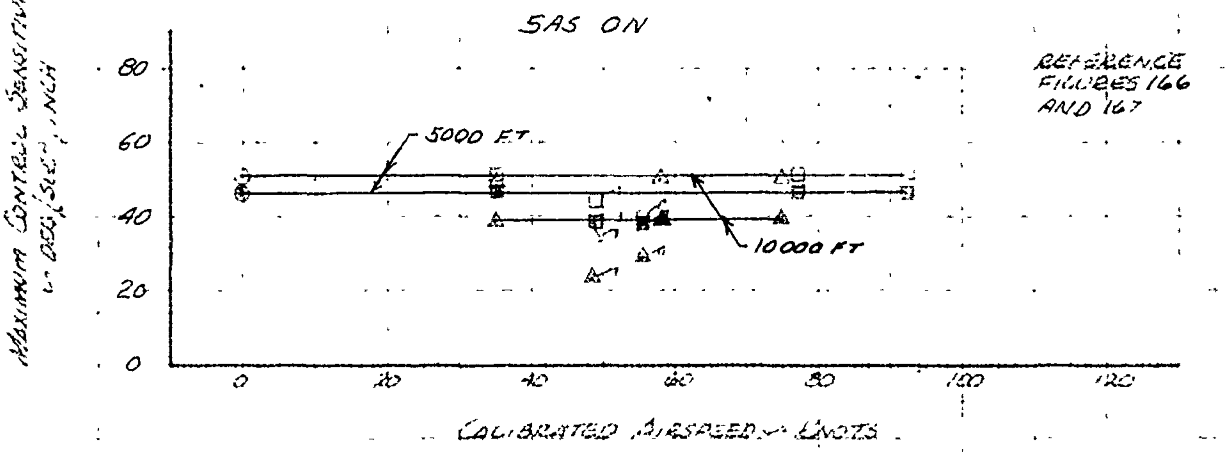
NOTE

1 SHADED SYMBOLS DENOTE YAW LEFT

2 SINGLE FLAG ON SYMBOL DENOTES CLIMB

3 DOUBLE FLAG ON SYMBOL DENOTES AUTOROTATION

4 HALF SHADED SYMBOL DENOTES BOTH RIGHT YAW AND LEFT YAW



SYM	AVG Hp ~ FT	AVG GW ~ LB	AVG CG ~ IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT COND
◇	1200	2730	95.4 (FWD)	0.2 LT	368	CLEAN	HOVER (IGE)
⬭	5300	2650	95.4 (FWD)	0.2 LT	368	CLEAN	LEVEL & NOTED
□	5000	2950	95.5 (FWD)	0.2 LT	368	CLEAN	LEVEL & NOTED

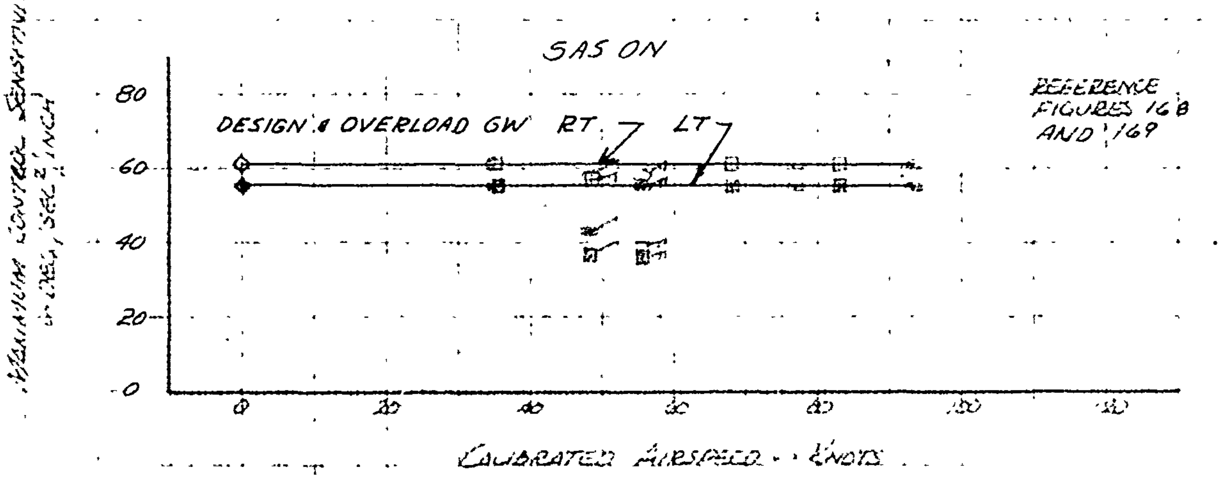


FIGURE NO. 165

SUMMARY OF DIRECTIONAL CONTROL SENSITIVITY

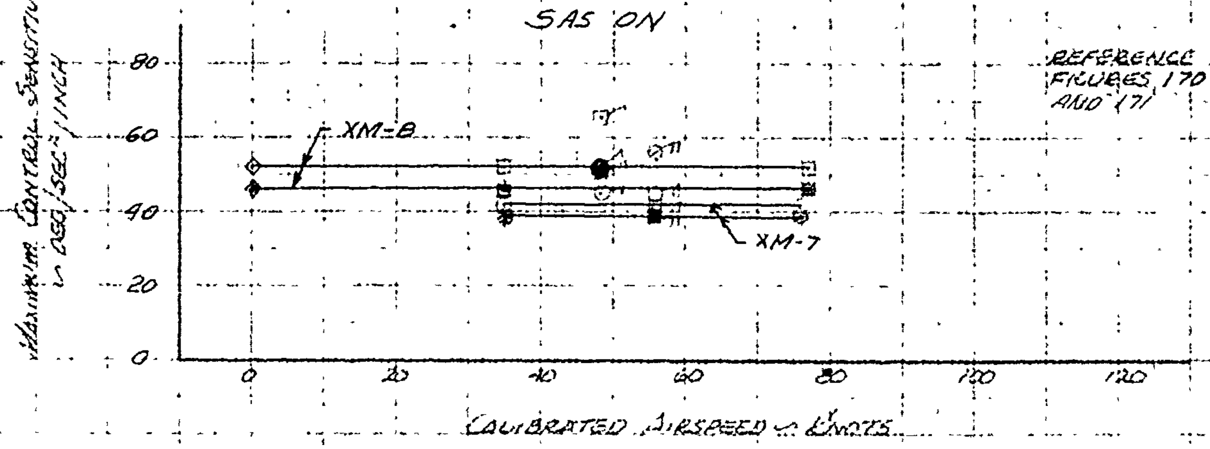
OH-5A USA S/N 62-4210

SYM	AVG. H_p ~ FT	AVG. G.W. ~ LB	AVG. C.G. ~ IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT COND
⊙	5000	2600	101.1(AFT)	1.1 LT	368	XM-7	LEVEL & NOTED
◇	1600	2700	101.3(AFT)	0.3 RT	368	XM-8	HOVER
□	5000	2670	101.2(AFT)	0.3 RT	368	XM-8	LEVEL & NOTED

NOTE

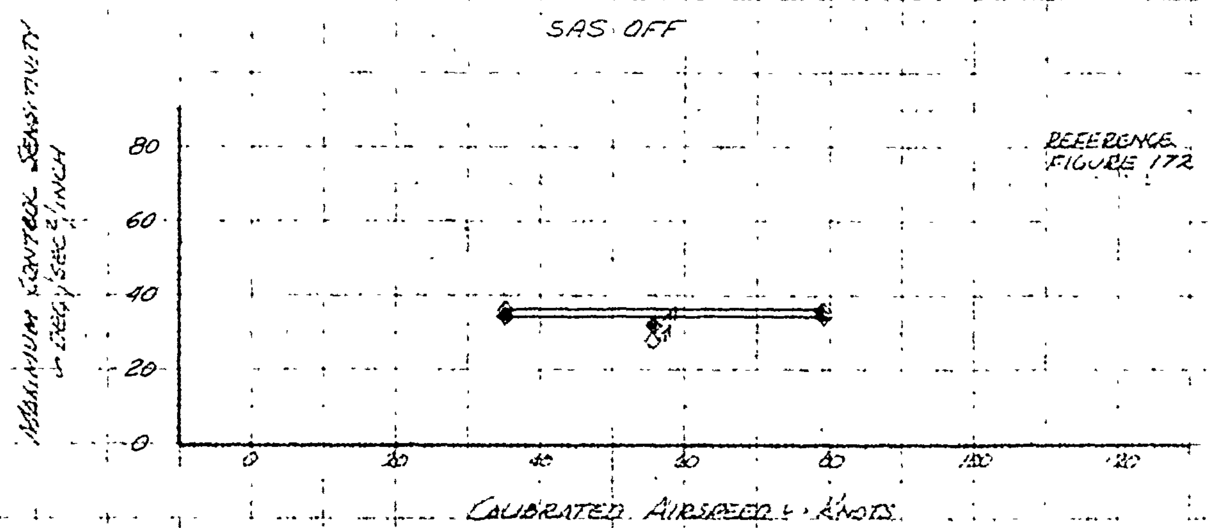
1. SHADED SYMBOLS DENOTE YAW LEFT
2. SINGLE FLAG ON SYMBOL DENOTES CLIMB
3. DOUBLE FLAG ON SYMBOL DENOTES AUTOROTATION
4. HALF SHADED SYMBOL DENOTES BOTH RIGHT YAW AND LEFT YAW

SAS ON



SYM	AVG. H_p ~ FT	AVG. G.W. ~ LB	AVG. C.G. ~ IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT COND
◇	5400	2680	101.4 (AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED

SAS OFF



FOR OFFICIAL USE ONLY

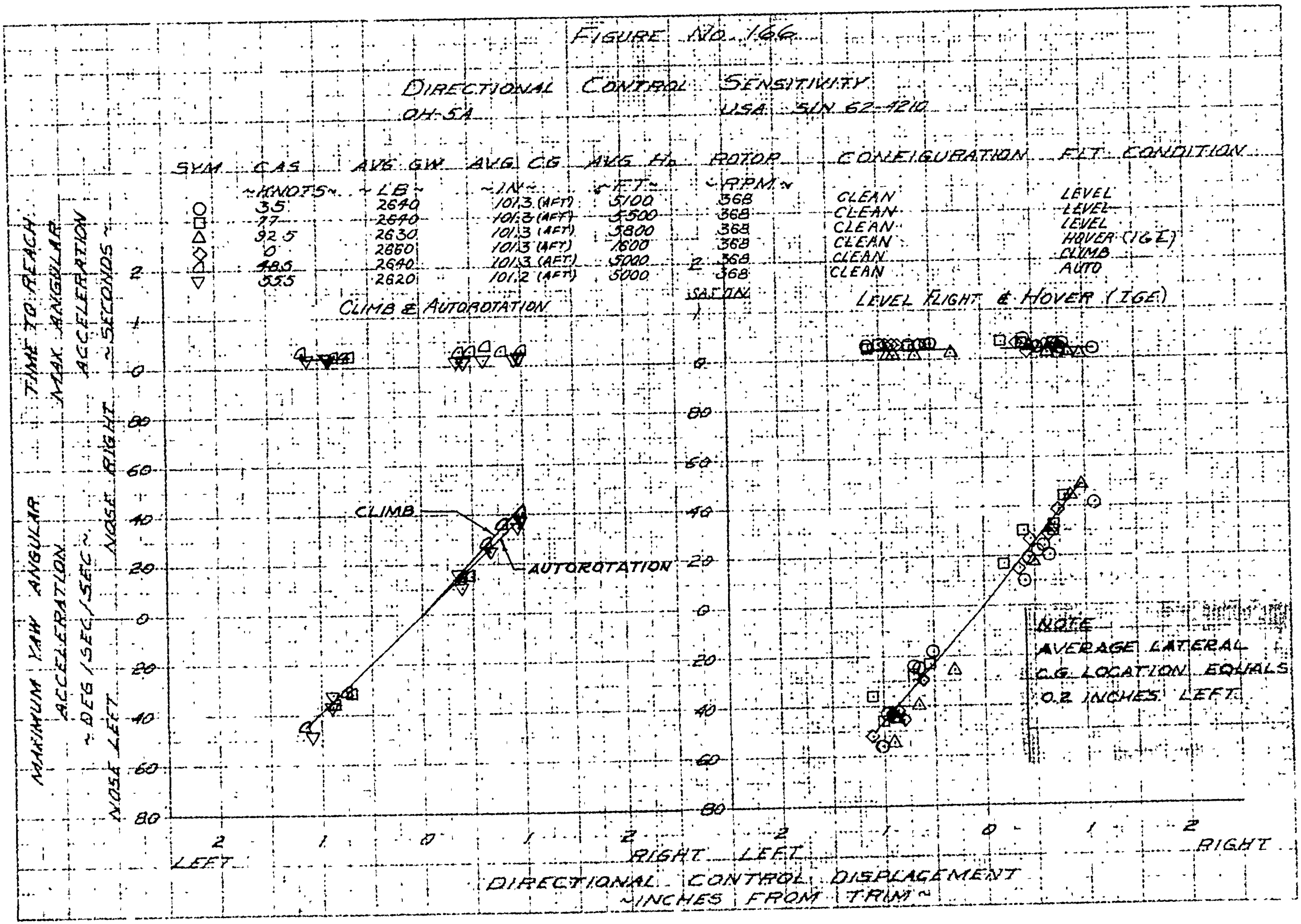


FIGURE NO. 166
DIRECTIONAL CONTROL SENSITIVITY
OH-5A USA S/N 62-4210
SYM CAS AVG GW AVG CG AVG Hp ROTOR CONFIGURATION FLT CONDITION
~KNOTS~ ~LB~ ~IN~ ~FT~ ~RPM~
35 2640 101.3 (AFT) 5100 368 CLEAN LEVEL
77 2640 101.3 (AFT) 5500 368 CLEAN LEVEL
92.5 2630 101.3 (AFT) 5800 368 CLEAN LEVEL
0 2660 101.3 (AFT) 1600 368 CLEAN HOVER (IGE)
48.5 2640 101.3 (AFT) 5000 368 CLEAN CLIMB
55.5 2620 101.2 (AFT) 5000 368 CLEAN AUTO
CLIMB & AUTOROTATION
LEVEL FLIGHT & HOVER (IGE)
CLIMB
AUTOROTATION
TIME TO REACH MAX ANGULAR ACCELERATION ~ SECONDS ~
MAXIMUM YAW ANGULAR ACCELERATION ~DEG/SEC/SEC~
NOSE RIGHT
NOSE LEFT
NOTE
AVERAGE LATERAL C.G. LOCATION EQUALS 0.2 INCHES LEFT.
LEFT
RIGHT
DIRECTIONAL CONTROL DISPLACEMENT ~INCHES FROM TRIM~

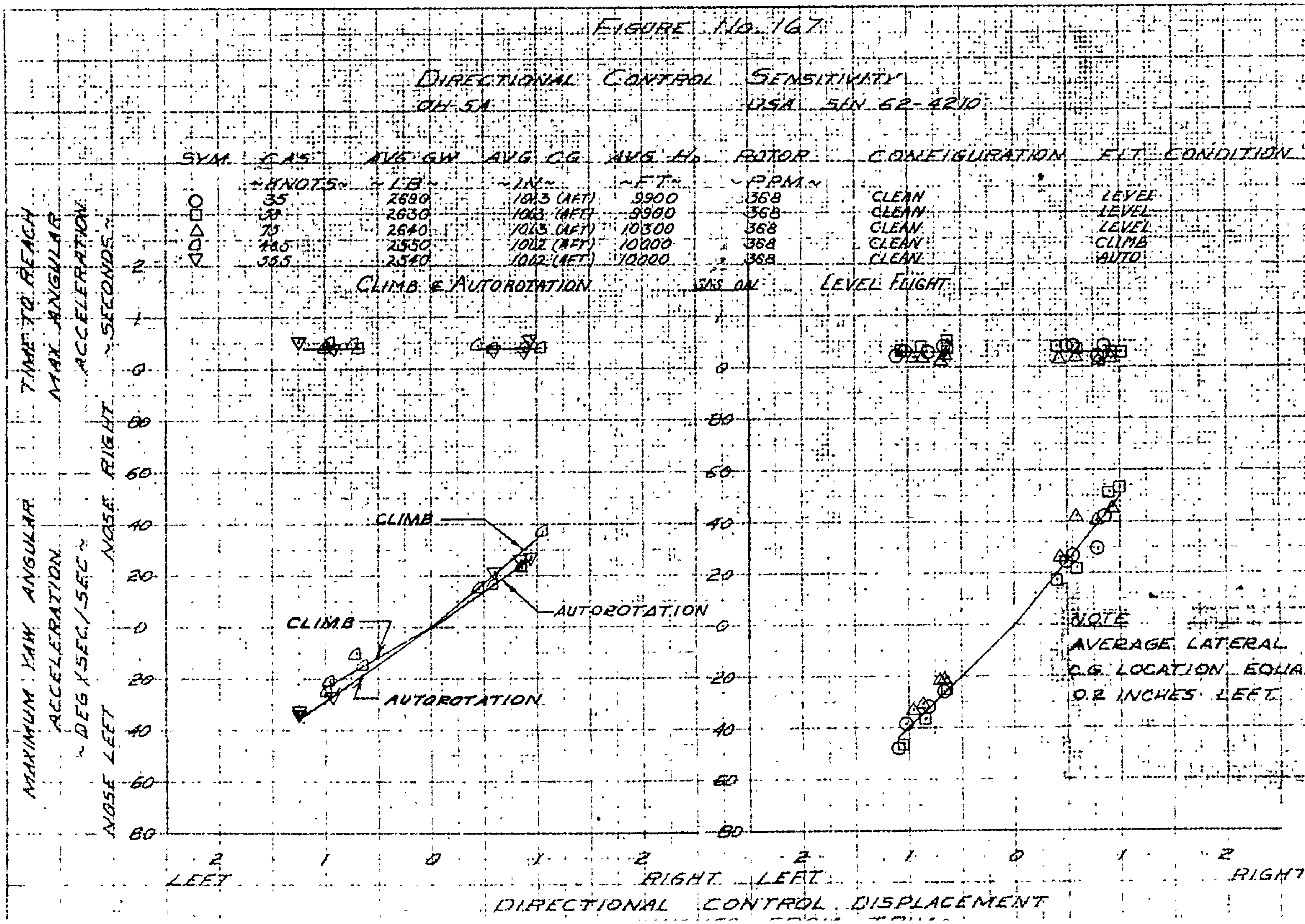


FIGURE NO. 167
DIRECTIONAL CONTROL SENSITIVITY
OH-5A USA S/N 62-4210
SYM CAS AVG GW AVG CG AVG Hp ROTOR CONFIGURATION FLT CONDITION
~KNOTS~ ~LB~ ~IN~ ~FT~ ~RPM~
35 2680 101.3 (AFT) 9900 368 CLEAN LEVEL
38 2630 101.3 (AFT) 9980 368 CLEAN LEVEL
75 2640 101.3 (AFT) 10300 368 CLEAN LEVEL
46.5 2550 101.2 (AFT) 10000 368 CLEAN CLIMB
55.5 2540 101.2 (AFT) 10000 368 CLEAN AUTO
CLIMB & AUTOROTATION
LEVEL FLIGHT
TIME TO REACH MAX ANGULAR ACCELERATION ~SECONDS~
MAXIMUM YAW ANGULAR ACCELERATION ~DEG/SEC/SEC~
NOSE RIGHT
NOSE LEFT
CLIMB
AUTOROTATION
NOTE
AVERAGE LATERAL C.G. LOCATION EQUALS 0.2 INCHES LEFT
LEFT
RIGHT
DIRECTIONAL CONTROL DISPLACEMENT

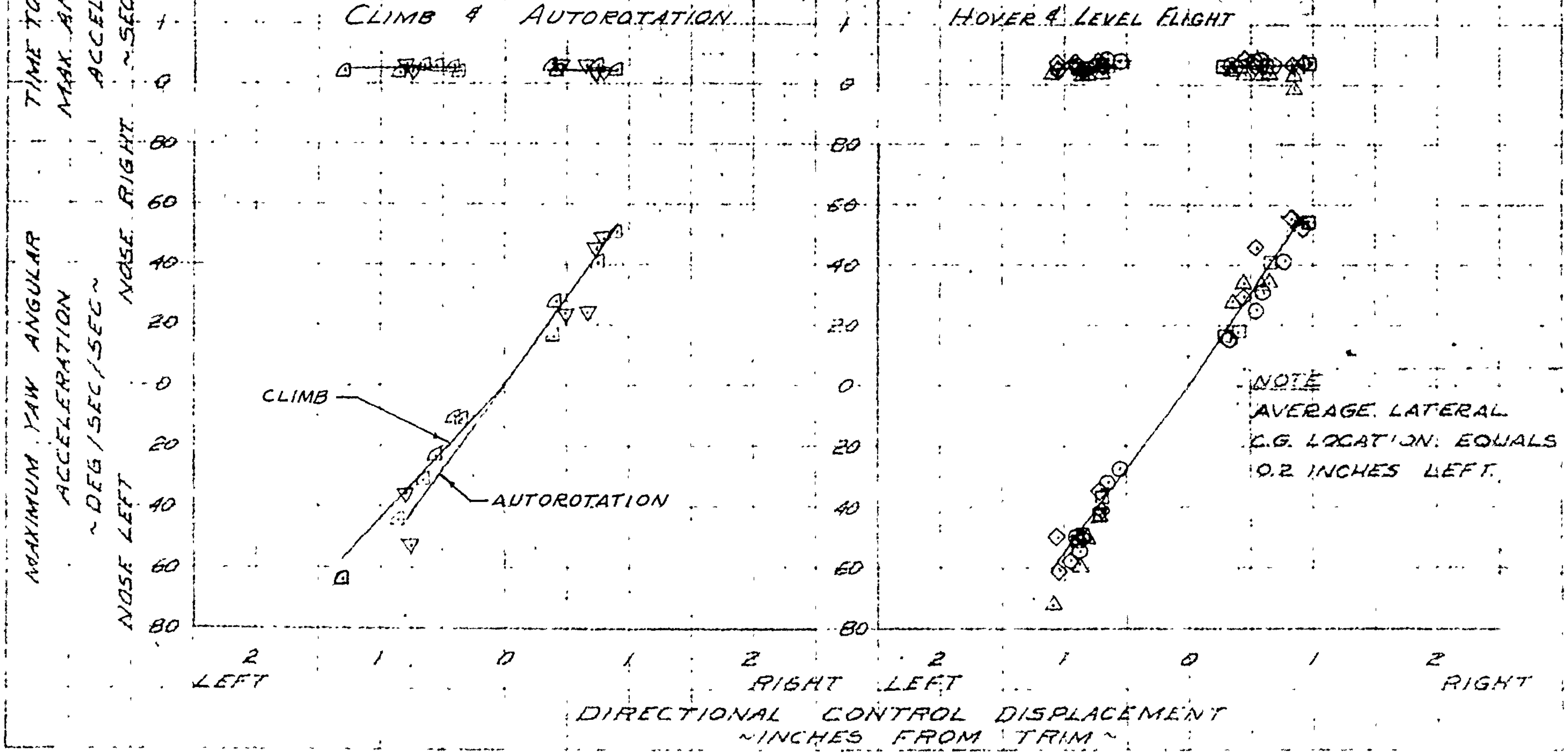
FIGURE No. 168

DIRECTIONAL CONTROL SENSITIVITY

OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG CG ~IN~	AVG H_p ~FT~	ROTOR ~RPM~	CONFIGURATION	FLT CONDITION
○	35	2640	95.4 (FWD)	5900	368	CLEAN	LEVEL
□	77	2650	95.4 (FWD)	5600	368	CLEAN	LEVEL
△	93.5	2660	95.4 (FWD)	4900	368	CLEAN	LEVEL
◇	0	2730	95.4 (FWD)	1200	368	CLEAN	HOVER (IGE)
⌂	48.5	2670	95.4 (FWD)	5000	368	CLEAN	CLIMB
▽	55.5	2650	95.4 (FWD)	5000	368	CLEAN	AUTO

SAS ON



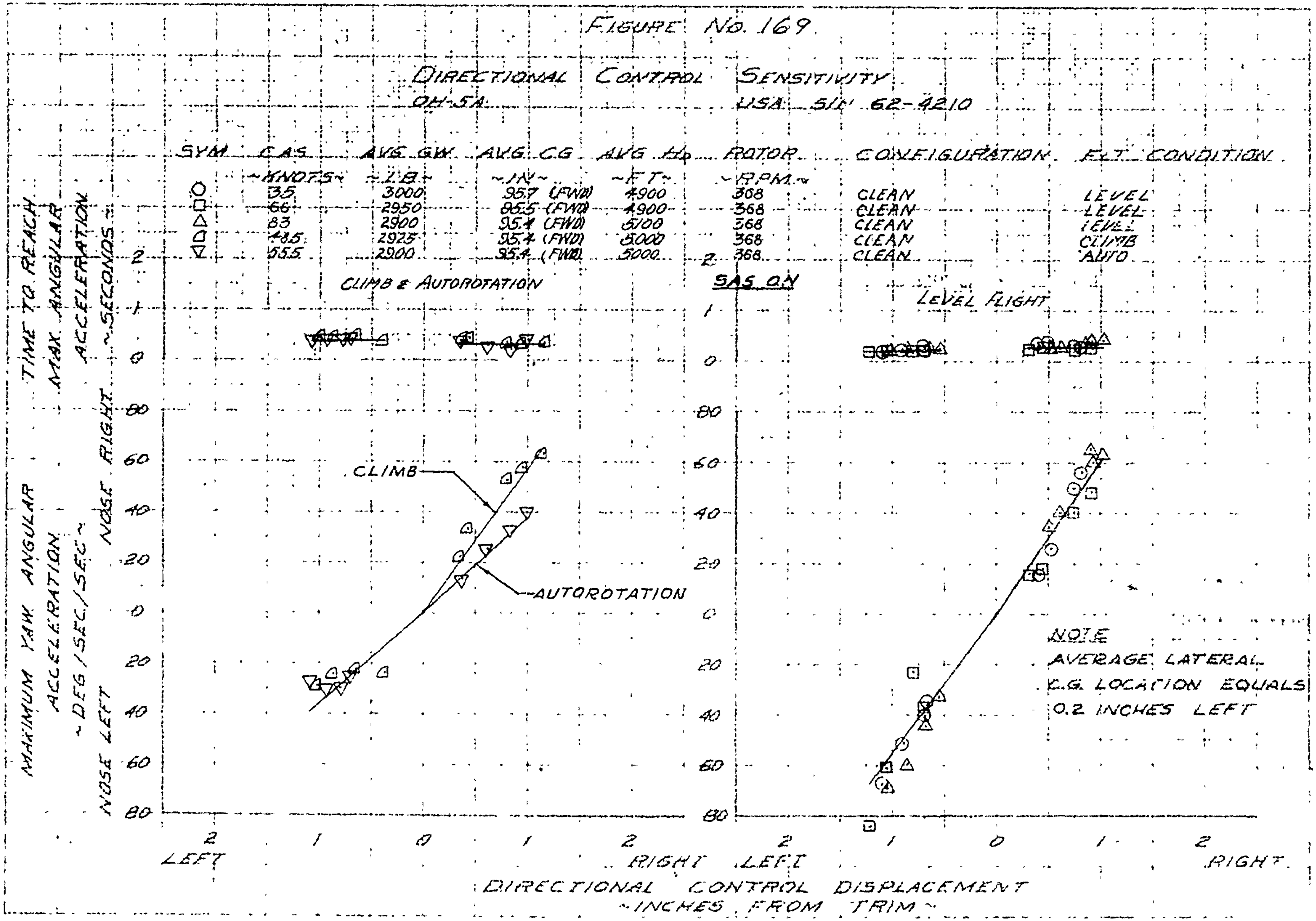


FIGURE No. 169
DIRECTIONAL CONTROL SENSITIVITY
OH-5A
USA S/N 62-4210
SYM
CAS ~KNOTS~
AVG GW ~LB~
AVG CG ~IN~
AVG Hp ~FT~
ROTOR ~RPM~
CONFIGURATION
FLT CONDITION
35 3000 95.7 (FWD) 4900 368 CLEAN LEVEL
66 2950 95.5 (FWD) 4900 368 CLEAN LEVEL
83 2900 95.4 (FWD) 5100 368 CLEAN LEVEL
48.5 2925 95.4 (FWD) 5000 368 CLEAN CLIMB
55.5 2900 95.4 (FWD) 5000 368 CLEAN AUTO
CLIMB & AUTOROTATION
SAS ON
LEVEL FLIGHT
TIME TO REACH MAX ANGULAR ACCELERATION ~SECONDS
MAXIMUM YAW ANGULAR ACCELERATION ~DEG/SEC/SEC~
NOSE RIGHT
NOSE LEFT
CLIMB
AUTOROTATION
NOTE
AVERAGE LATERAL C.G. LOCATION EQUALS 0.2 INCHES LEFT
LEFT
RIGHT
DIRECTIONAL CONTROL DISPLACEMENT ~INCHES FROM TRIM~

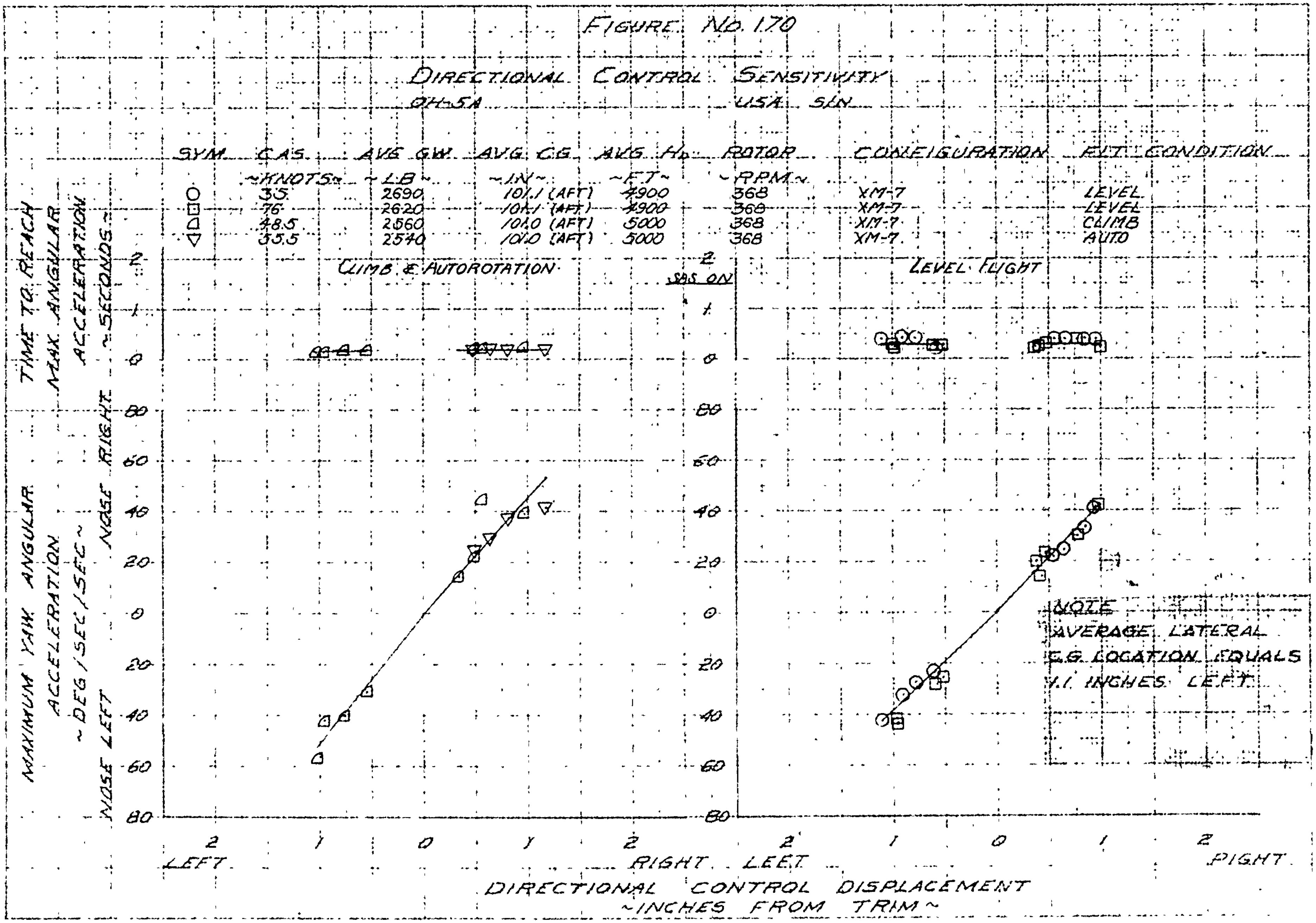


FIGURE No. 170
DIRECTIONAL CONTROL SENSITIVITY
OH-5A
USA S/N
SYM
CAS ~KNOTS~
AVG GW ~LB~
AVG CG ~IN~
AVG H_p ~FT~
ROTOR ~RPM~
CONFIGURATION
FLT CONDITION
35 2690 101.1 (AFT) 4900 368 XM-7 LEVEL
76 2620 101.1 (AFT) 4900 368 XM-7 LEVEL
48.5 2560 101.0 (AFT) 5000 368 XM-7 CLIMB
35.5 2540 101.0 (AFT) 5000 368 XM-7 AUTO
CLIMB & AUTOROTATION
LEVEL FLIGHT
SAS ON
TIME TO REACH MAX ANGULAR ACCELERATION ~SECONDS~
MAXIMUM YAW ANGULAR ACCELERATION ~DEG/SEC/SEC~
NOSE RIGHT
NOSE LEFT
NOTE
AVERAGE LATERAL
C.G. LOCATION EQUALS
1.1 INCHES LEFT
LEFT
RIGHT
DIRECTIONAL CONTROL DISPLACEMENT
~INCHES FROM TRIM~

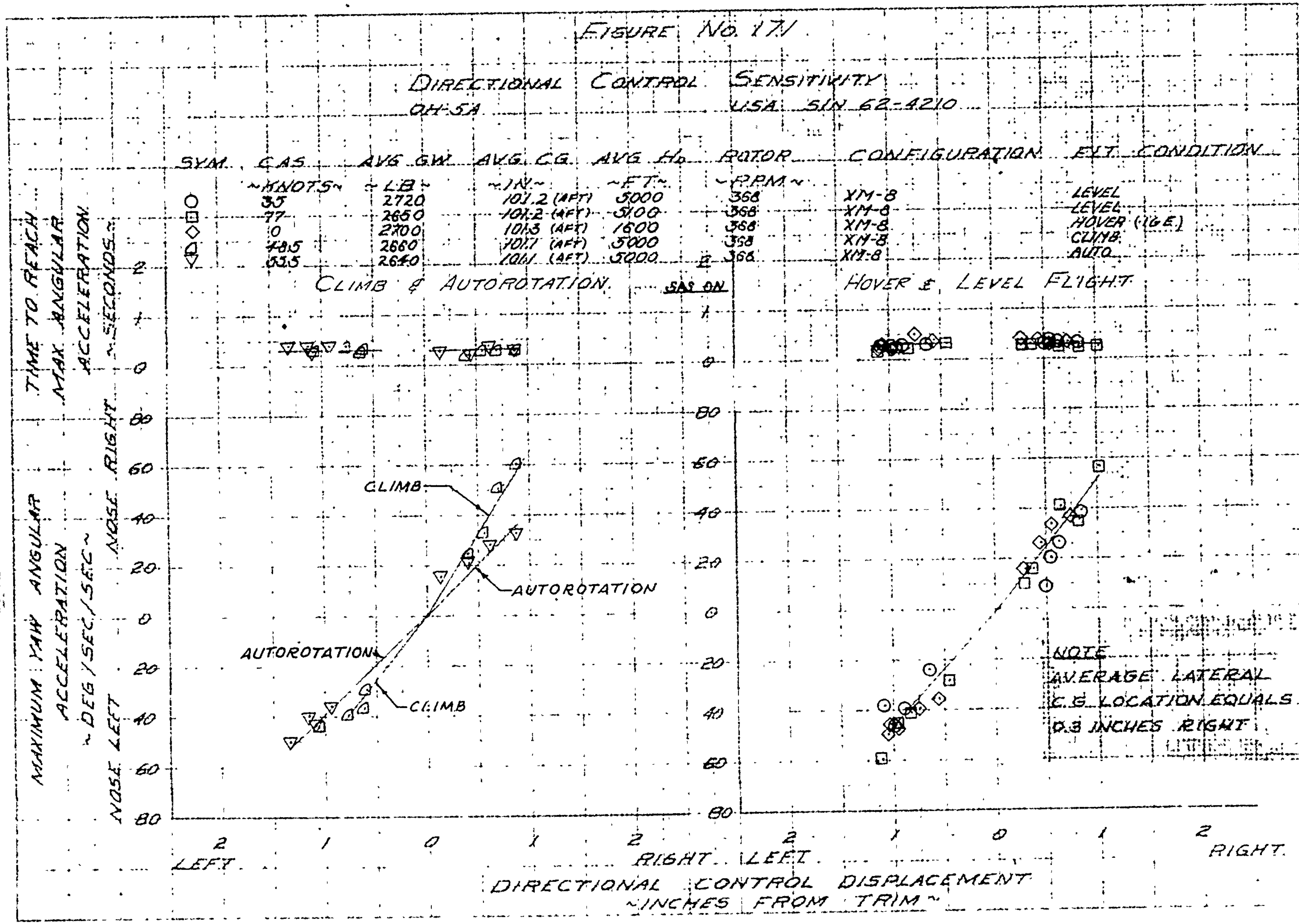


FIGURE NO. 171
DIRECTIONAL CONTROL SENSITIVITY
OH-5A
USA S/N 62-4210
SYM. CAS AVG GW AVG C.G. AVG H_p ROTOR CONFIGURATION FLT CONDITION
~KNOTS~ ~LB~ ~IN~ ~FT~ ~RPM~
35 2720 101.2 (AFT) 5000 368 XM-8 LEVEL
77 2650 101.2 (AFT) 5100 368 XM-8 LEVEL
0 2700 101.3 (AFT) 1600 368 XM-8 HOVER (IGE)
48.5 2660 101.7 (AFT) 5000 358 XM-8 CLIMB
53.5 2640 101.1 (AFT) 5000 368 XM-8 AUTO
SAS ON
CLIMB & AUTOROTATION
HOVER & LEVEL FLIGHT
TIME TO REACH MAX ANGULAR ACCELERATION ~ SECONDS
MAXIMUM YAW ANGULAR ACCELERATION ~DEG/SEC/SEC~
NOSE RIGHT
NOSE LEFT
CLIMB
AUTOROTATION
NOTE
AVERAGE LATERAL C.G. LOCATION EQUALS 0.3 INCHES RIGHT
LEFT
RIGHT
DIRECTIONAL CONTROL DISPLACEMENT ~INCHES FROM TRIM~

FIGURE No. 172

DIRECTIONAL CONTROL SENSITIVITY

OH-5A USA S/N 62-4209

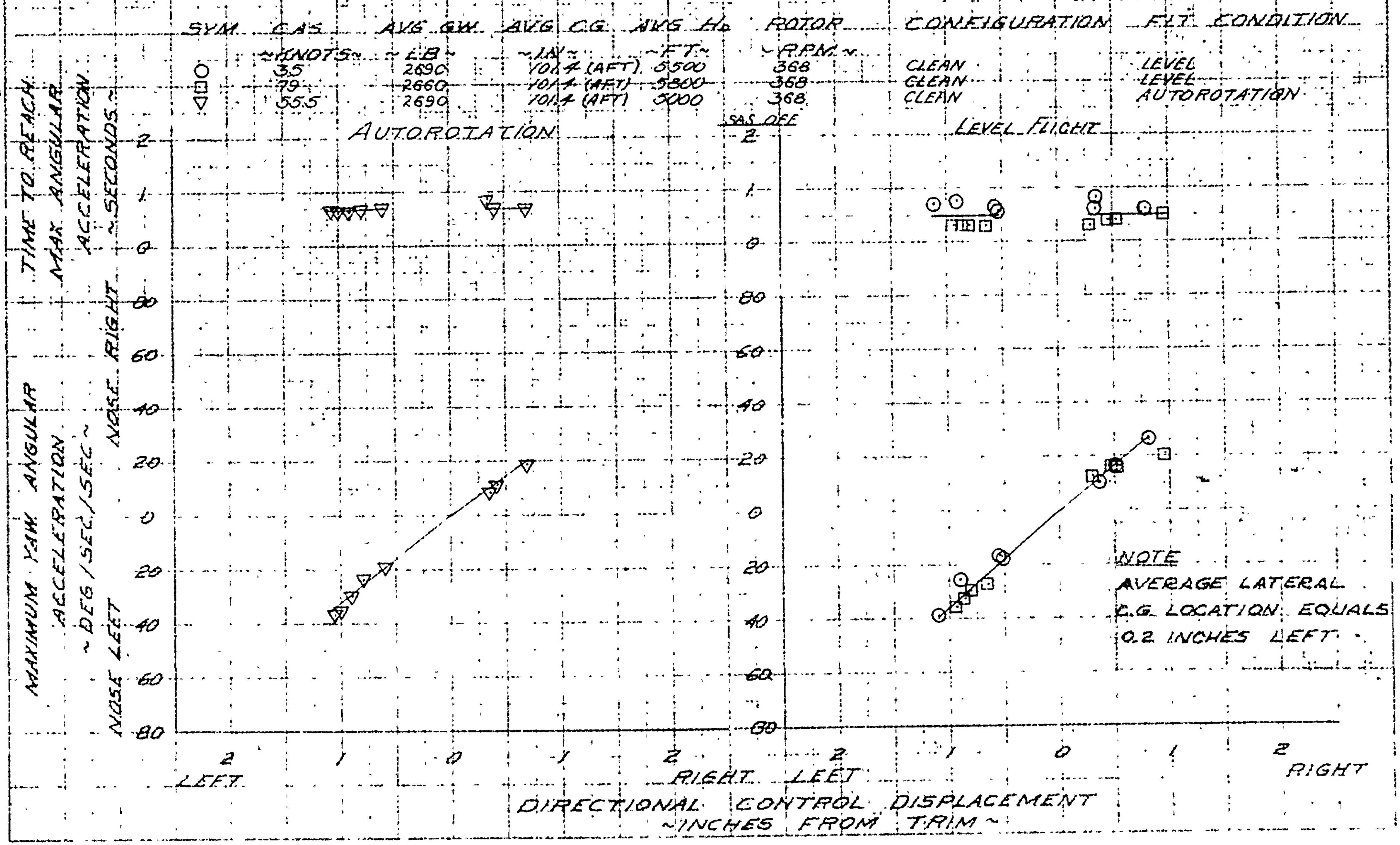
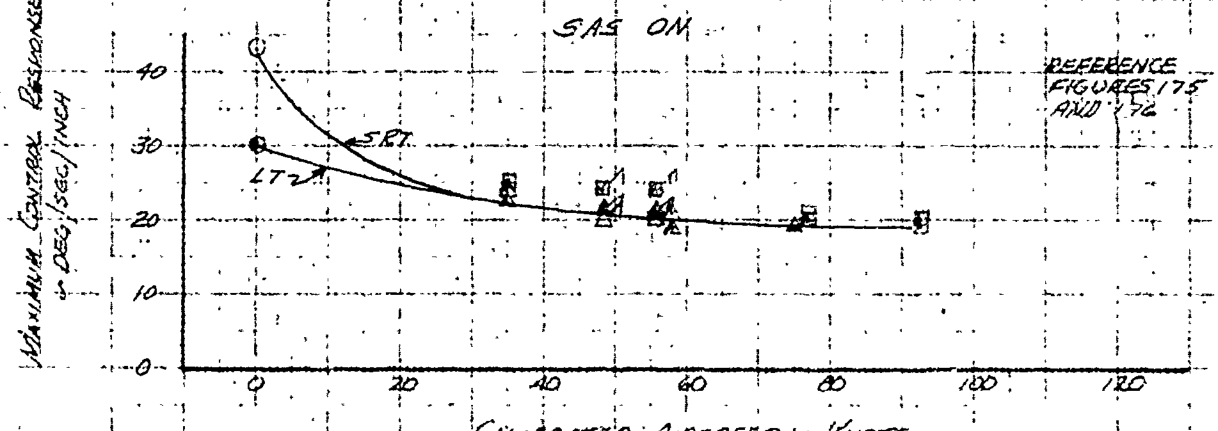


FIGURE NO. 173
SUMMARY OF DIRECTIONAL CONTROL RESPONSE
OH-5A USA S/N 62-4210

SYM	AVG H_p ~ FT	AVG G.W. ~ LB	AVG C.G. ~ IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT COND.
○	1600	2660	101.3(AFT)	0.2 LT	368	CLEAN	HOVER (IGE)
□	5300	2640	101.3(AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED
△	10000	2610	101.2(AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED

NOTE
1. SHADED SYMBOLS DENOTE YAW LEFT
2. SINGLE FLAG ON SYMBOL DENOTES CLIMB
3. DOUBLE FLAG ON SYMBOL DENOTES AUTOROTATION
4. HALF SHADED SYMBOL DENOTES BOTH RIGHT YAW AND LEFT YAW



SYM	AVG H_p ~ FT	AVG G.W. ~ LB	AVG C.G. ~ IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT COND.
◇	1200	2730	95.4(FWD)	0.2 LT	368	CLEAN	HOVER (IGE)
⬭	5300	2650	95.4(FWD)	0.2 LT	368	CLEAN	LEVEL & NOTED
□	5000	2950	95.5(FWD)	0.2 LT	368	CLEAN	LEVEL & NOTED

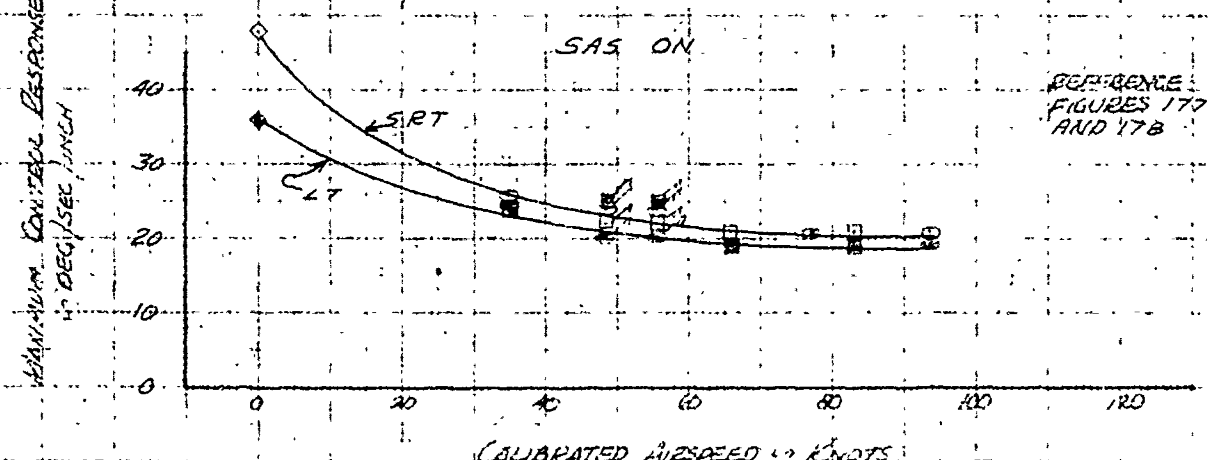


FIGURE NO. 174

SUMMARY OF DIRECTIONAL CONTROL RESPONSE

OH-5A USA S/N 62-4210

SYM	AVG H_0 ~ FT	AVG G.W ~ LB	AVG C.G ~ IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT COND.
⊙	5000	2600	101.1(AFT)	1.1 LT	368	XM-7	LEVEL & NOTED
◇	1600	2700	101.3(AFT)	0.3 RT	368	XM-8	HOVER (IGE)
□	5000	2670	101.2(AFT)	0.3 RT	368	XM-8	LEVEL & NOTED

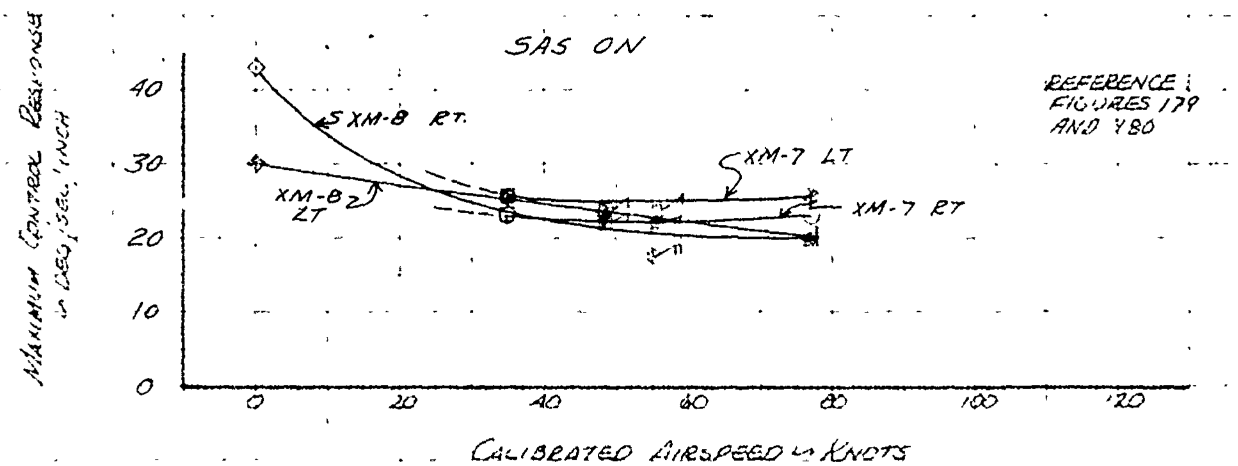
NOTE

1 SHADED SYMBOLS DENOTE YAW LEFT

2 SINGLE FLAG ON SYMBOL DENOTES CLIMB

3 DOUBLE FLAG ON SYMBOL DENOTES AUTOROTATION

4 HALF SHADED SYMBOL DENOTES BOTH RIGHT YAW AND LEFT YAW



SYM	AVG H_0 ~ FT	AVG G.W. ~ LB	AVG C.G. ~ IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT COND.
◇	5400	2680	101.4(AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED

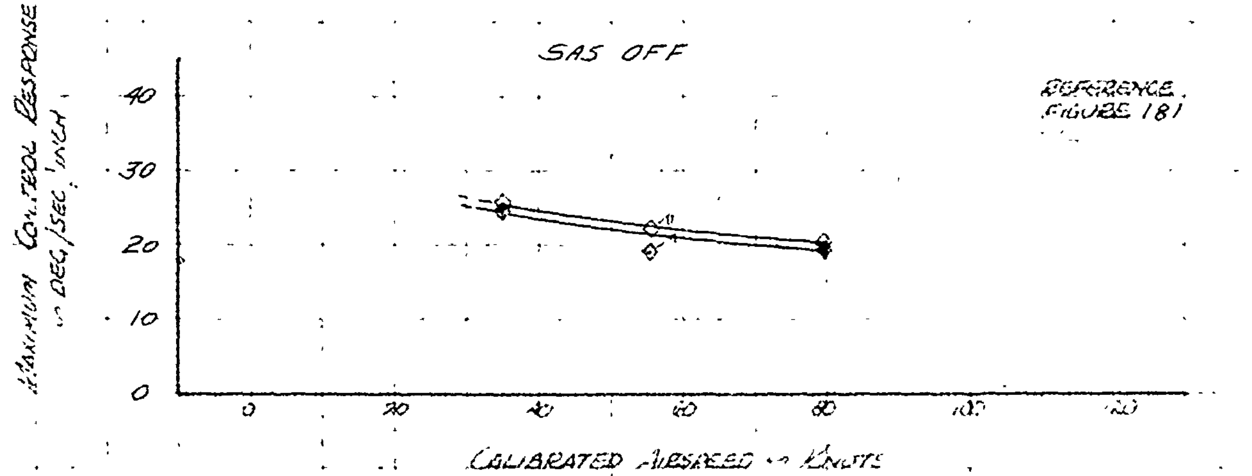


FIGURE No. 175

DIRECTIONAL CONTROL RESPONSE
OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG CG ~IN~	AVG H_D ~FT~	ROTOR ~RPM~	CONFIGURATION	FLT CONDITION
○	35	2640	101.3 (AFT)	5100	368	CLEAN	LEVEL
□	77	2640	101.3 (AFT)	5500	368	CLEAN	LEVEL
△	92.5	2630	101.3 (AFT)	5800	368	CLEAN	LEVEL
◇	0	2660	101.3 (AFT)	1600	368	CLEAN	HOVER (IGE)
◻	48.5	2640	101.3 (AFT)	5000	368	CLEAN	CLIMB
▽	55.5	2620	101.2 (AFT)	5000	368	CLEAN	AUTO

SAS ON

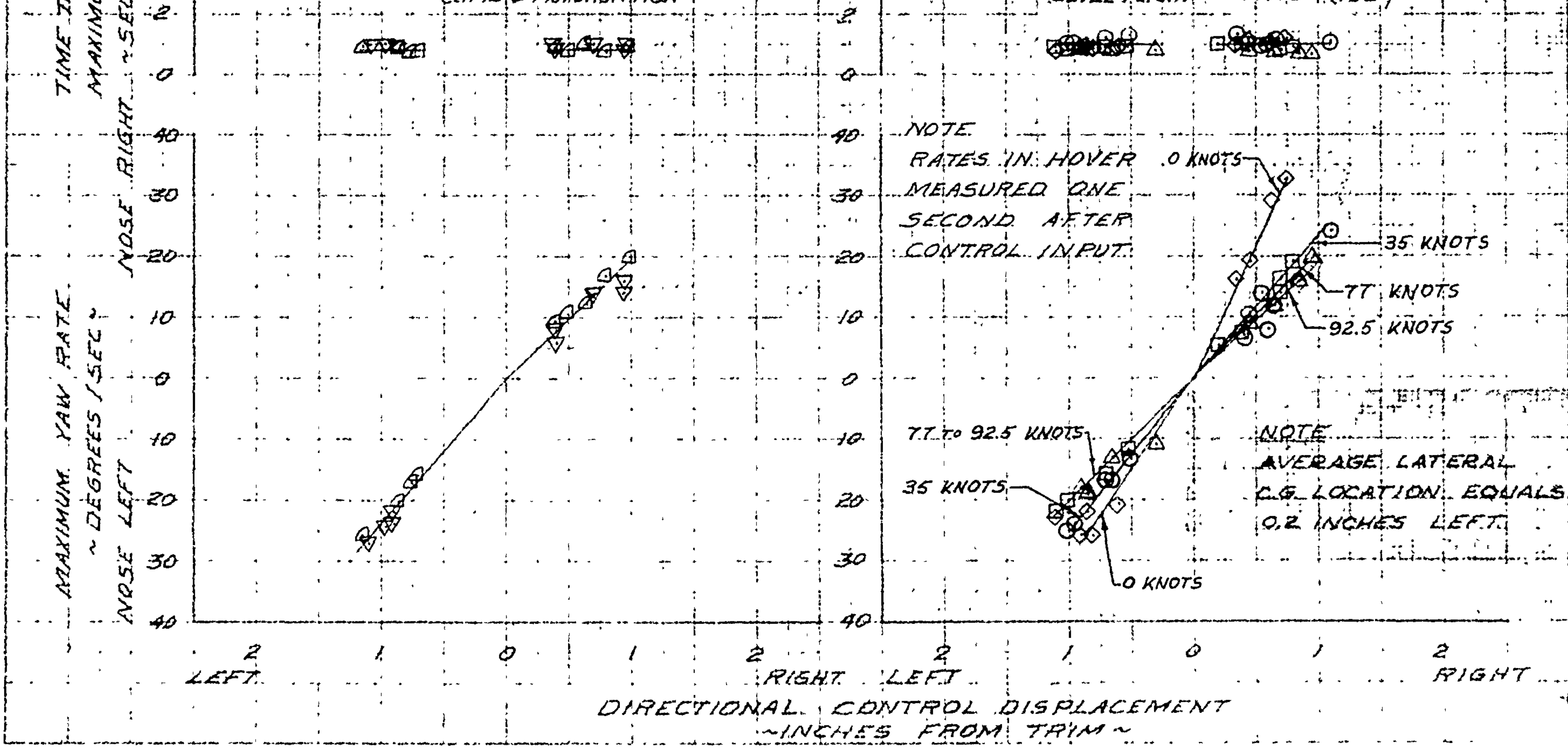
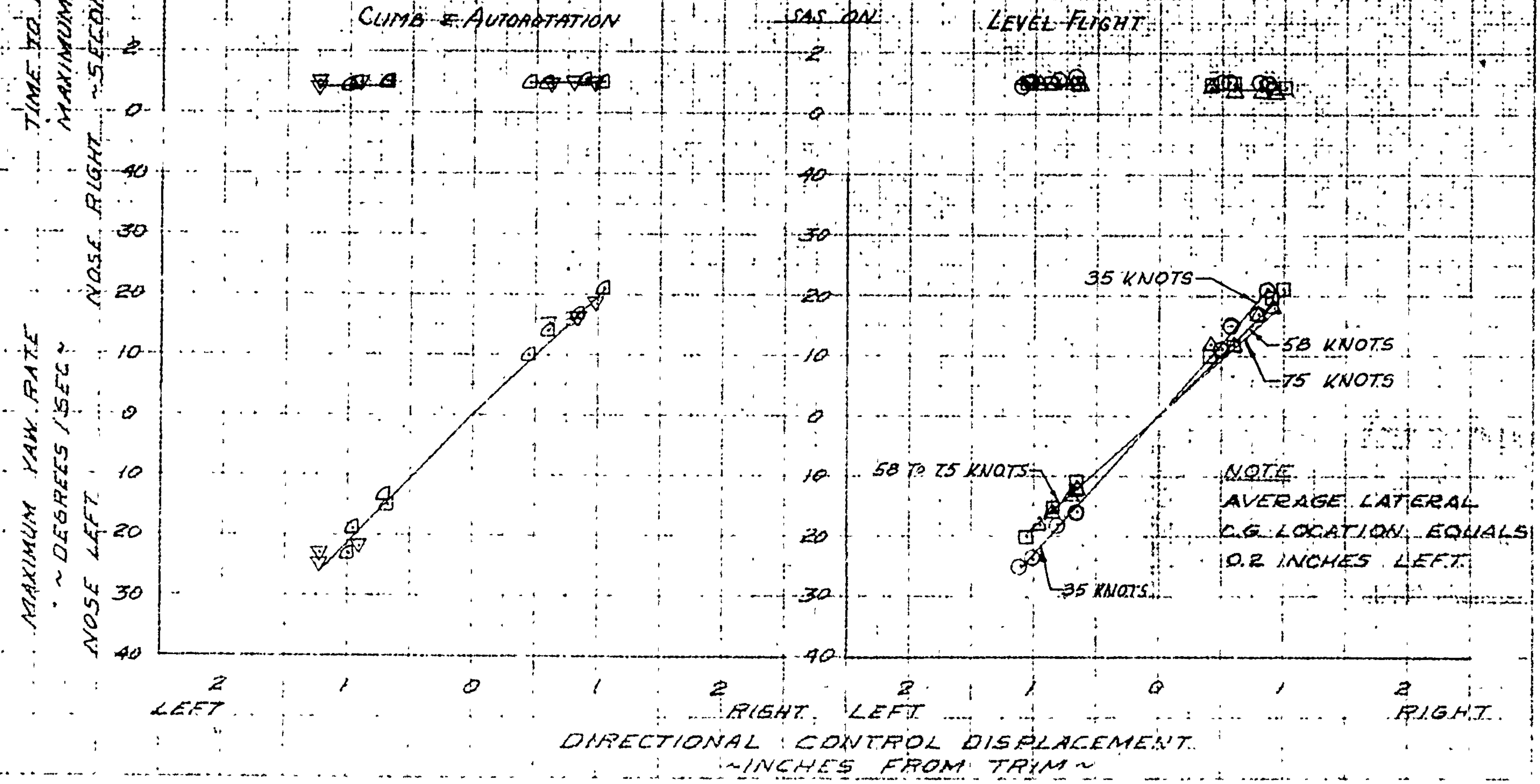


Figure No. 176

Directional Control Response
OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG G.W. ~LB~	AVG C.G. ~IN~	AVG H_D ~FT~	ROTOR ~RPM~	CONFIGURATION	FLT CONDITION
○	35	2690	101.3 (AFT)	9900	368	CLEAN	LEVEL
□	58	2630	101.3 (AFT)	9800	368	CLEAN	LEVEL
△	75	2640	101.3 (AFT)	10300	368	CLEAN	LEVEL
◇	48.5	2550	101.2 (AFT)	10000	368	CLEAN	CLIMB
▽	55.5	2540	101.2 (AFT)	10000	368	CLEAN	AUTO



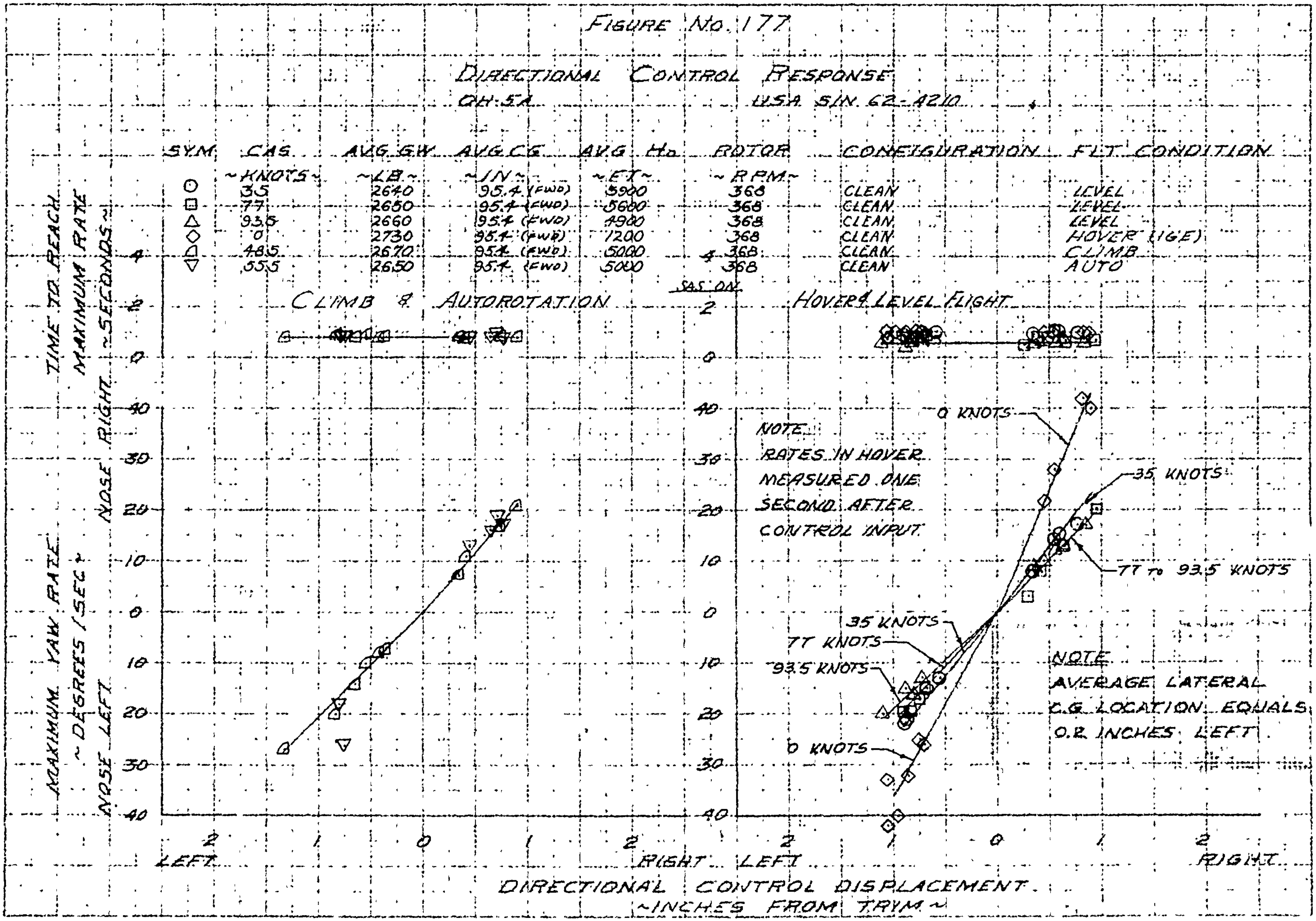
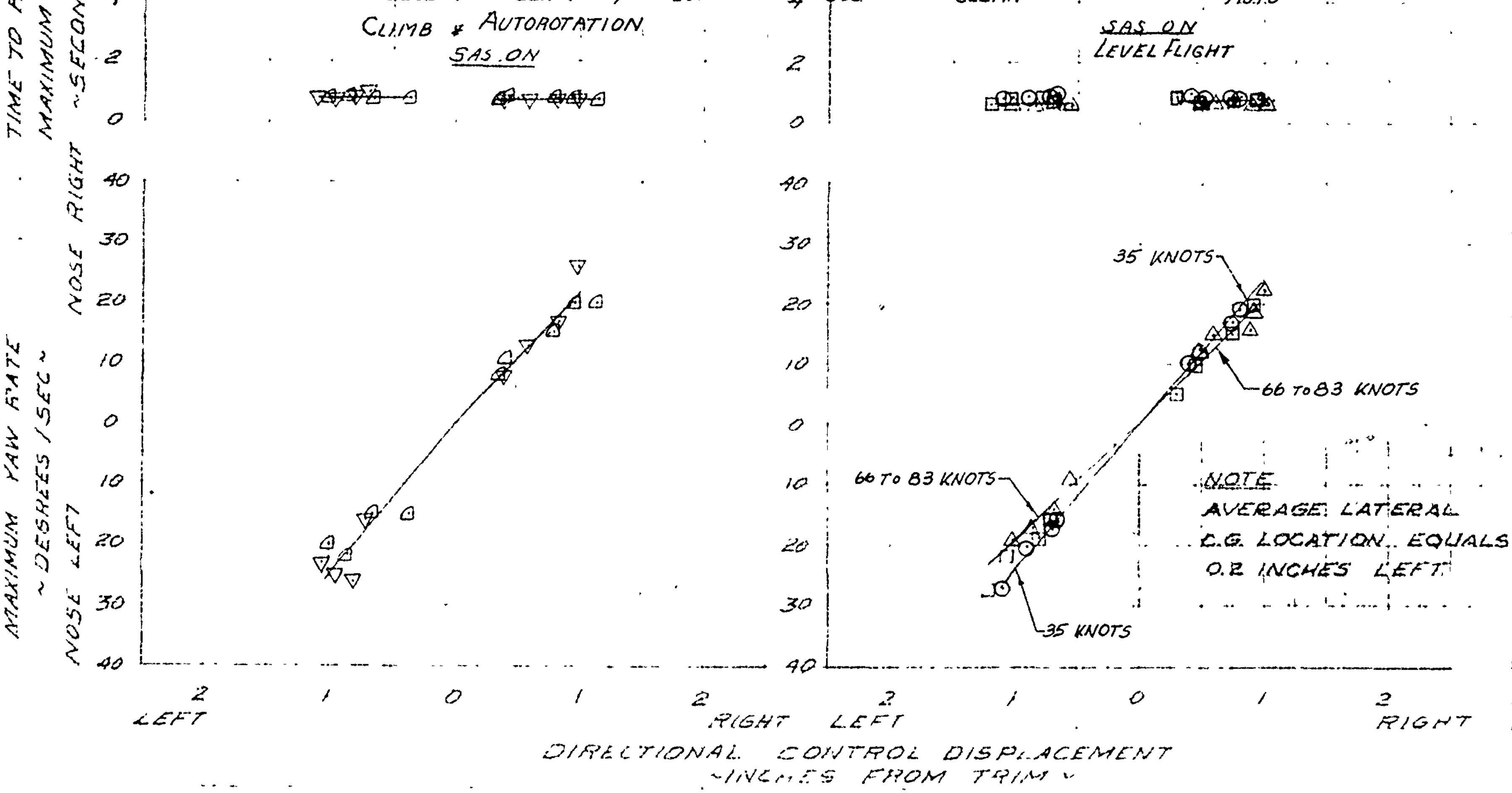


FIGURE No. 177
DIRECTIONAL CONTROL RESPONSE
OH-5A
USA S/N 62-4210
SYM CAS ~KNOTS~ | AVG GW ~LB~ | AVG CG ~IN~ | AVG Hp ~FT~ | ROTOR ~RPM~ | CONFIGURATION | FLT CONDITION
○ 35 2640 95.4 (FWD) 5900 368 CLEAN LEVEL
□ 77 2650 95.4 (FWD) 5600 368 CLEAN LEVEL
△ 93.5 2660 95.4 (FWD) 4900 368 CLEAN LEVEL
◇ 0 2730 95.4 (FWD) 7200 368 CLEAN HOVER (IGE)
◺ 48.5 2670 95.4 (FWD) 5000 368 CLEAN CLIMB
▽ 55.5 2650 95.4 (FWD) 5000 368 CLEAN AUTO
SAS ON
CLIMB & AUTOROTATION
HOVER & LEVEL FLIGHT
TIME TO REACH MAXIMUM RATE ~SECONDS~
MAXIMUM YAW RATE ~DEGREES/SEC~
NOSE RIGHT
NOSE LEFT
NOTE
RATES IN HOVER MEASURED ONE SECOND AFTER CONTROL INPUT
0 KNOTS
35 KNOTS
77 TO 93.5 KNOTS
35 KNOTS
77 KNOTS
93.5 KNOTS
0 KNOTS
NOTE
AVERAGE LATERAL C.G. LOCATION EQUALS 0.2 INCHES LEFT
LEFT
RIGHT
LEFT
RIGHT
DIRECTIONAL CONTROL DISPLACEMENT ~INCHES FROM TRIM~

FIGURE No. 178

DIRECTIONAL CONTROL RESPONSE
OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG CG ~IN~	AVG Hp ~FT~	ROTOR ~RPM~	CONFIGURATION	FLT. CONDITION
○	35	3000	95.7 (FWD)	4900	368	CLEAN	LEVEL
□	66	2950	95.5 (FWD)	4900	368	CLEAN	LEVEL
△	83	2900	95.4 (FWD)	5100	368	CLEAN	LEVEL
◁	48.5	2925	95.4 (FWD)	5000	368	CLEAN	CLIMB
▽	55.5	2900	95.4 (FWD)	5000	368	CLEAN	AUTO



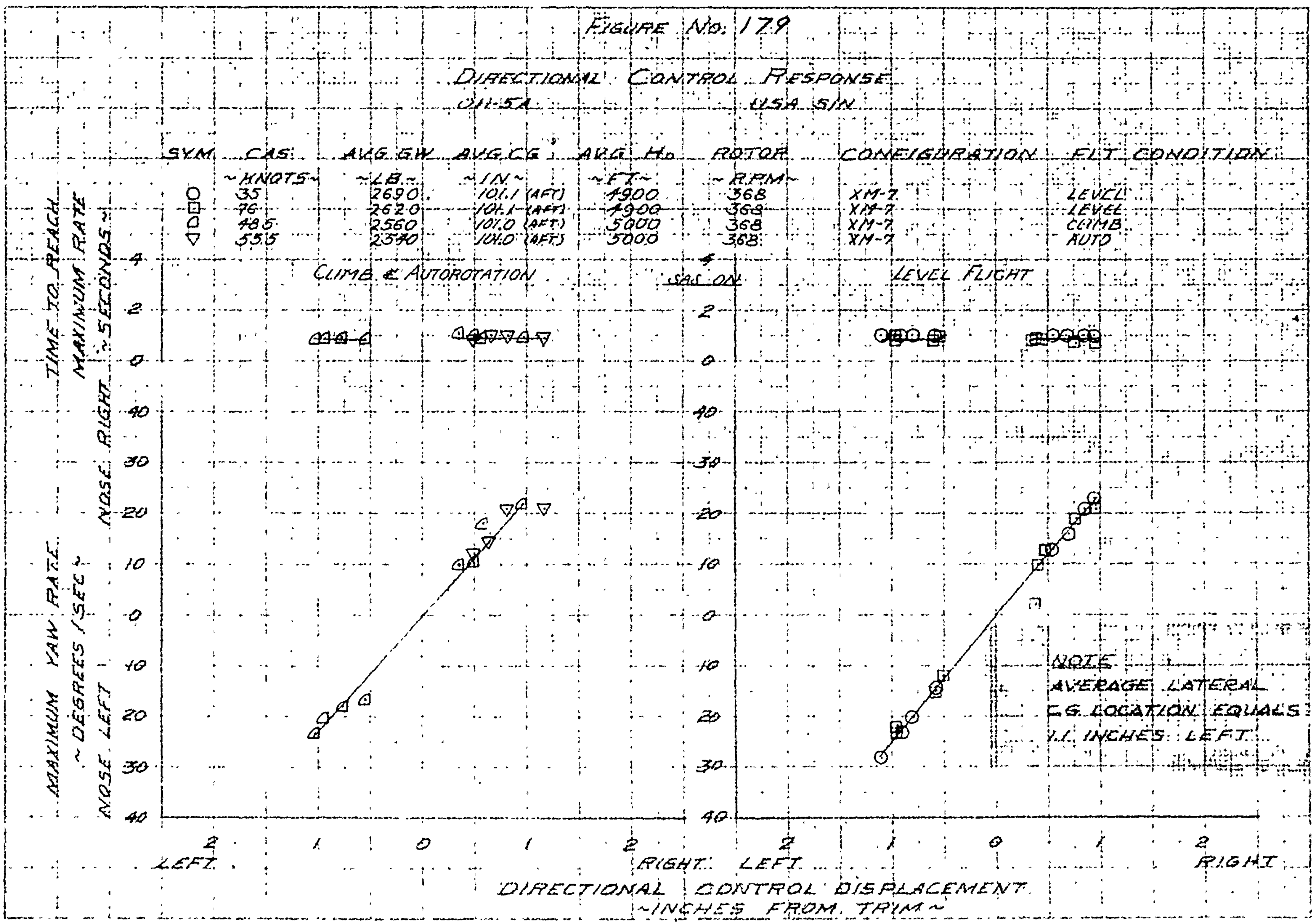


FIGURE No. 179
DIRECTIONAL CONTROL RESPONSE
OH-5A USA S/N
SYM CAS AVG GW AVG CG AVG Hp ROTOR CONFIGURATION FLT CONDITION
~KNOTS~ ~LB~ ~IN~ ~FT~ ~RPM~
○ 35 2690 101.1 (AFT) 4900 368 XM-7 LEVEL
□ 76 2620 101.1 (AFT) 4900 368 XM-7 LEVEL
△ 48.5 2560 101.0 (AFT) 5000 368 XM-7 CLIMB
▽ 55.5 2540 101.0 (AFT) 5000 368 XM-7 AUTO
CLIMB & AUTOROTATION
SAS ON
LEVEL FLIGHT
TIME TO REACH MAXIMUM RATE ~SECONDS~
MAXIMUM YAW RATE ~DEGREES/SEC~
NOSE RIGHT
NOSE LEFT
NOTE
AVERAGE LATERAL C.G. LOCATION EQUALS 1.1 INCHES LEFT
LEFT
RIGHT
DIRECTIONAL CONTROL DISPLACEMENT ~INCHES FROM TRIM~

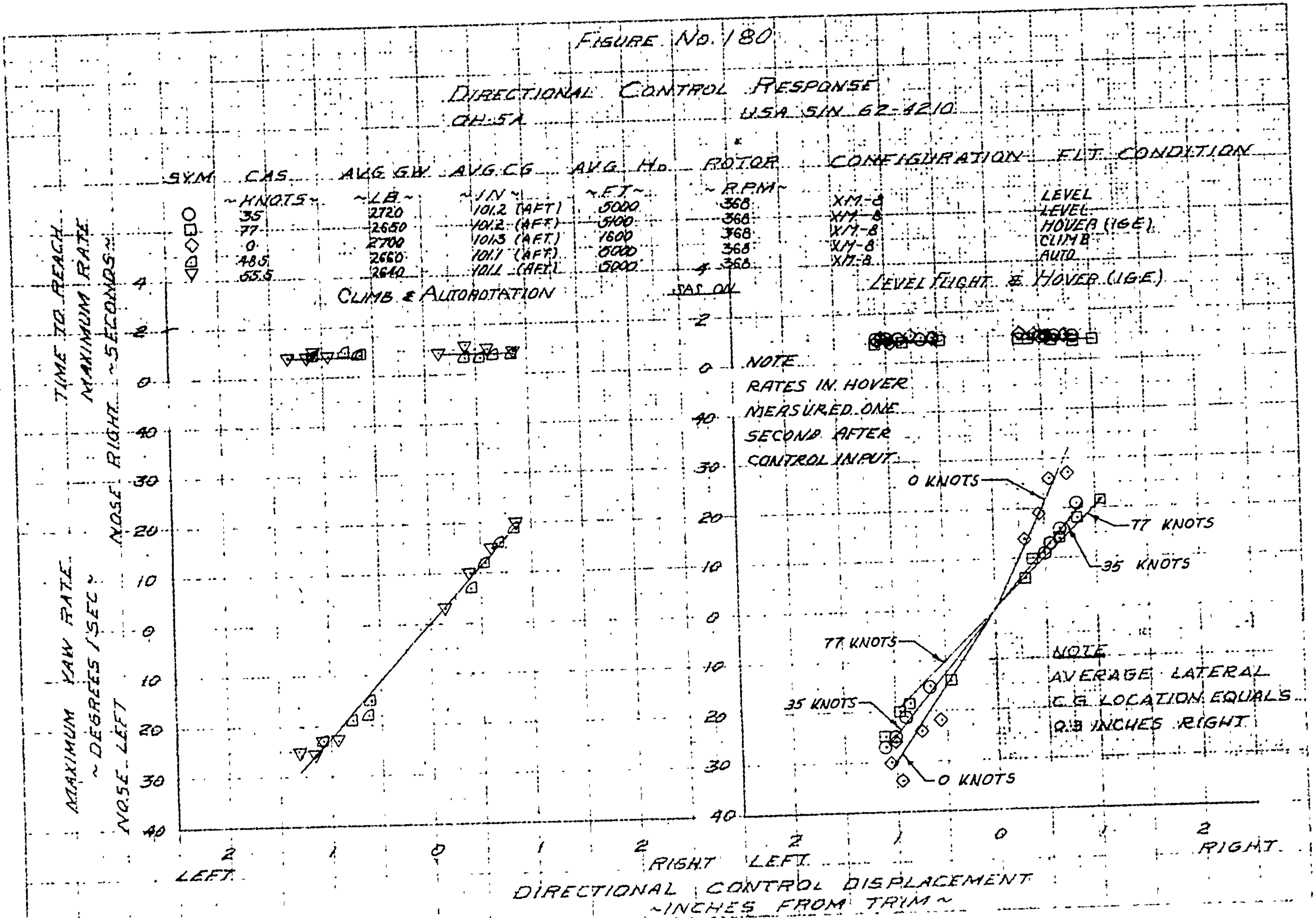


FIGURE No. 180
DIRECTIONAL CONTROL RESPONSE
OH-5A
USA S/N 62-4210
SYM
CAS ~KNOTS~
AVG G.W. ~LB.~
AVG. C.G. ~IN~
AVG. Hp ~FT~
ROTOR ~R.P.M.~
CONFIGURATION
FLT. CONDITION
35 2720 101.2 (AFT) 5000 368 XM-8 LEVEL
77 2650 101.2 (AFT) 5100 368 XM-8 LEVEL
0 2700 101.3 (AFT) 1600 368 XM-8 HOVER (IGE)
48.5 2660 101.1 (AFT) 6000 368 XM-8 CLIMB
65.5 2640 101.1 (AFT) 5000 368 XM-8 AUTO
CLIMB & AUTOROTATION
SAS ON
LEVEL FLIGHT & HOVER (IGE)
NOTE
RATES IN HOVER MEASURED ONE SECOND AFTER CONTROL INPUT
0 KNOTS
77 KNOTS
35 KNOTS
NOTE
AVERAGE LATERAL C.G. LOCATION EQUALS 0.3 INCHES RIGHT
TIME TO REACH MAXIMUM RATE ~SECONDS~
MAXIMUM YAW RATE ~DEGREES/SEC~
NOSE RIGHT
NOSE LEFT
LEFT
RIGHT
DIRECTIONAL CONTROL DISPLACEMENT ~INCHES FROM TRIM~

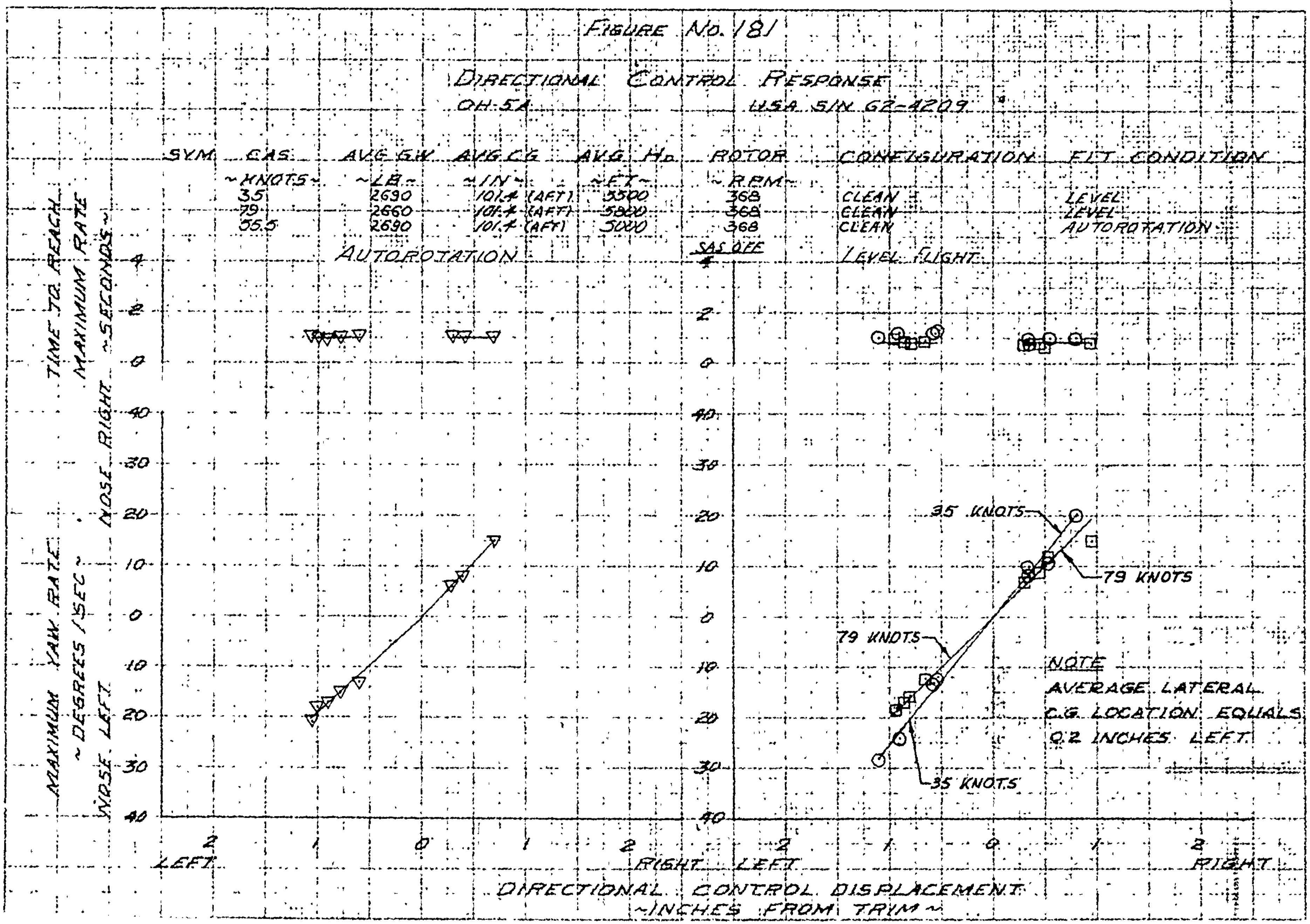


FIGURE No. 181
DIRECTIONAL CONTROL RESPONSE
OH-5A
USA S/N 62-4209
SYM
CAS ~KNOTS~
AVG G.W. ~LB~
AVG C.G. ~IN~
AVG. H_D ~FT~
ROTOR ~RPM~
CONFIGURATION
FLT CONDITION
35 2690 101.4 (AFT) 3500 368 CLEAN LEVEL
79 2660 101.4 (AFT) 5800 368 CLEAN LEVEL
55.5 2690 101.4 (AFT) 5000 368 CLEAN AUTOROTATION
AUTOROTATION
SAS OFF
LEVEL FLIGHT
TIME TO REACH MAXIMUM RATE ~SECONDS~
MAXIMUM YAW RATE ~DEGREES / SEC~
NOSE RIGHT
NOSE LEFT
35 KNOTS
79 KNOTS
79 KNOTS
35 KNOTS
NOTE
AVERAGE LATERAL C.G. LOCATION EQUALS 0.2 INCHES LEFT.
LEFT
RIGHT
LEFT
RIGHT
DIRECTIONAL CONTROL DISPLACEMENT ~INCHES FROM TRIM~

FIGURE No. 182

SUMMARY OF ANGULAR YAW DISPLACEMENT

OH-5A USA S/N 62-4210

SYM	AVG H_p ~ FT	AVG GW ~ LB	AVG C.G ~ IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT COND.
○	1600	2660	101.3 (AFT)	0.2 LT	368	CLEAN	HOVER (IGE)
□	5300	2640	101.3 (AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED
△	10000	2610	101.2 (AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED

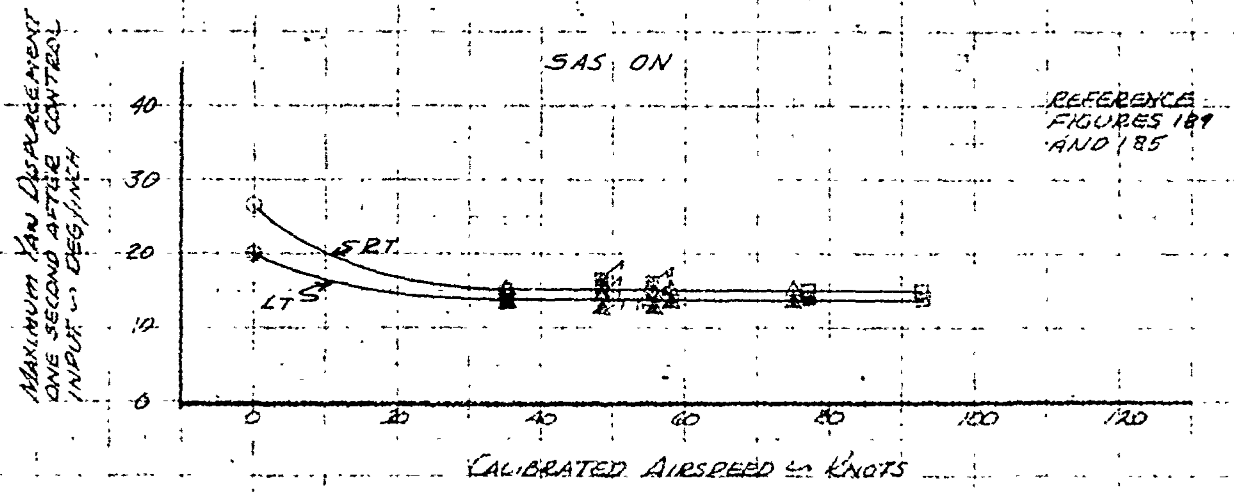
NOTE

1 SHADED SYMBOLS DENOTE YAW LEFT

2 SINGLE FLAG ON SYMBOL DENOTES CLIMB

3 DOUBLE FLAG ON SYMBOL DENOTES AUTOROTATION

4 HALF SHADED SYMBOL DENOTES BOTH RIGHT YAW AND LEFT YAW



SYM	AVG H_p ~ FT	AVG G.W. ~ LB	AVG C.G ~ IN LONG	LAT	ROTOR RPM	CONFIGURATION	FLT COND.
◇	1200	2730	95.4 (FWD)	0.2 LT	368	CLEAN	HOVER (IGE)
○	5300	2650	95.4 (FWD)	0.2 LT	368	CLEAN	LEVEL & NOTED
□	5000	2950	95.5 (FWD)	0.2 LT	368	CLEAN	LEVEL & NOTED

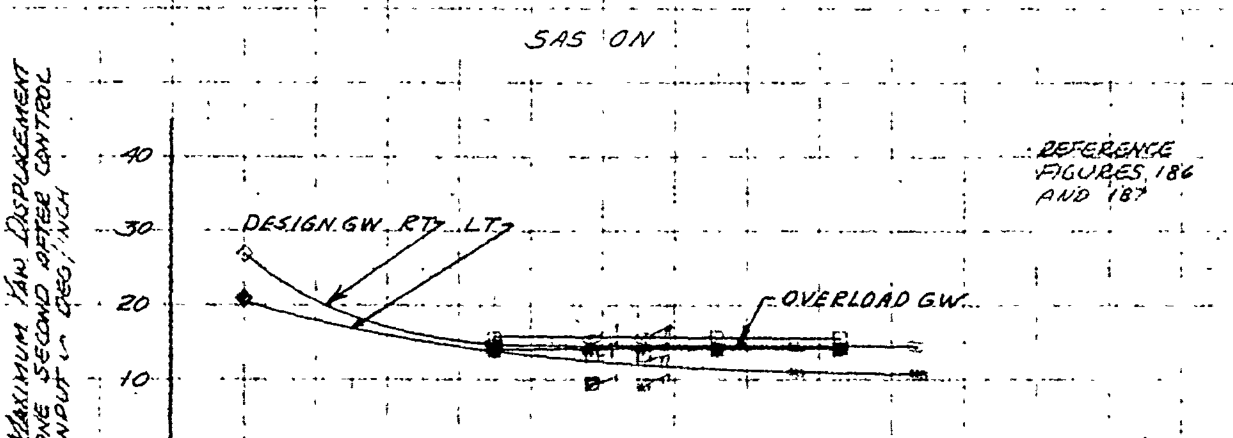
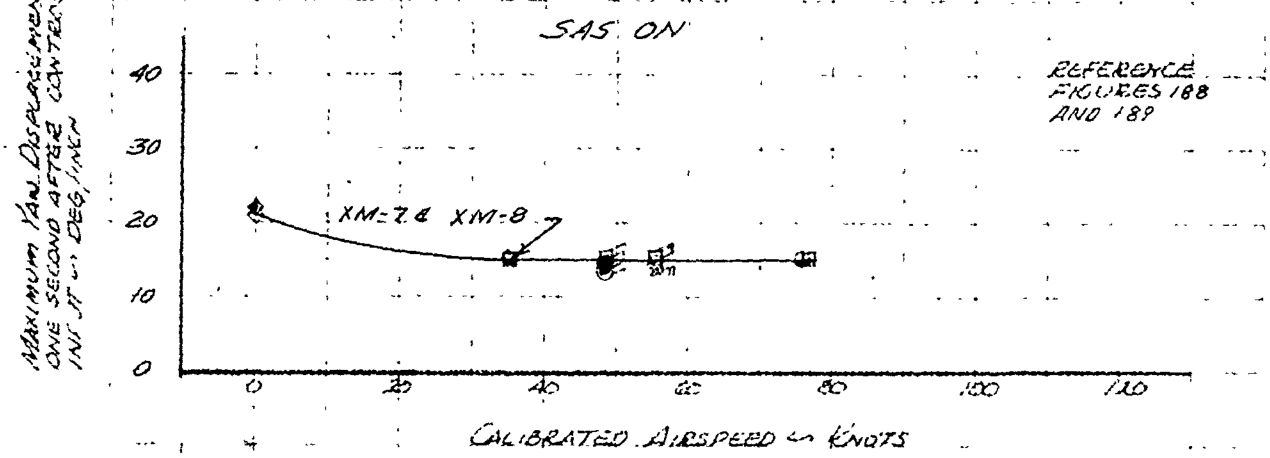


FIGURE NO. 183
SUMMARY OF ANGULAR YAW DISPLACEMENT
OH-5A USA S/N 62-4210

SYM	AVG H_p ~ FT	AVG GW ~ LB	AVG C.G ~ IN LONG	AVG C.G ~ IN LAT	ROTOR RPM	CONFIGURATION	FLT COND.
○	5000	2600	101.1(AFT)	1.1 LT	368	XM-7	LEVEL & NOTED
◇	1600	2700	101.3(AFT)	0.3 RT	368	XM-8	HOVER (IGE)
□	5000	2670	101.2(AFT)	0.3 RT	368	XM-8	LEVEL & NOTED

NOTE
1 SHADED SYMBOLS DENOTE YAW LEFT.
2 SINGLE FLAG ON SYMBOL DENOTES CLIMB
3 DOUBLE FLAG ON SYMBOL DENOTES AUTOROTATION
4 HALF SHADED SYMBOL DENOTES BOTH RIGHT YAW AND LEFT YAW



SYM	AVG H_p ~ FT	AVG G.W. ~ LB	AVG C.G ~ IN LONG	AVG C.G ~ IN LAT	ROTOR RPM	CONFIGURATION	FLT COND
◇	5400	2680	101.4 (AFT)	0.2 LT	368	CLEAN	LEVEL & NOTED

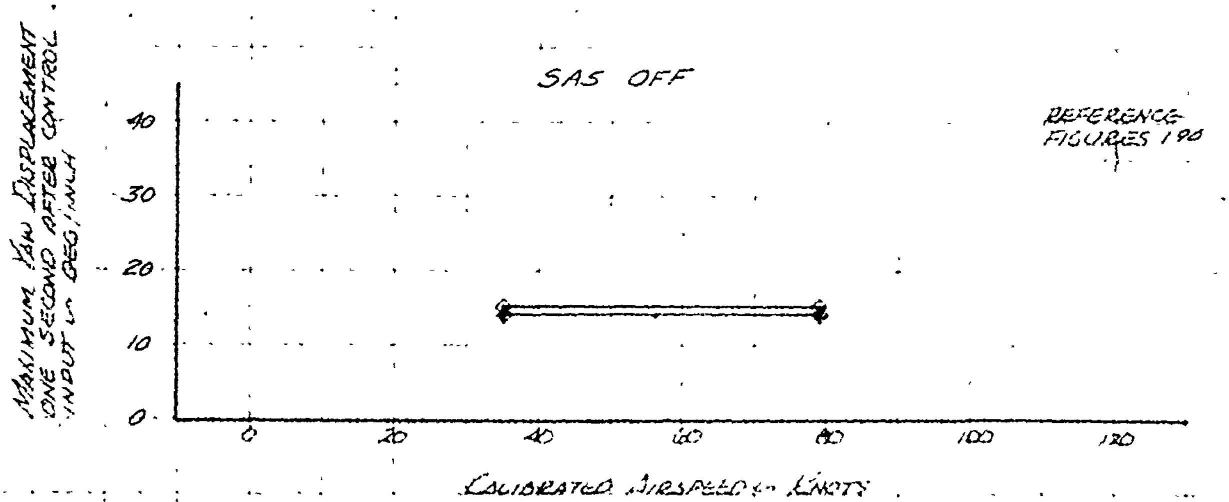


FIGURE No. 184

ANGULAR YAW DISPLACEMENT

OH-5A USA S/N. 62-4210

SYM.	CAS ~KNOTS~	AVG GW ~LB	AVG CG ~IN~	AVG H_p ~FT~	CONFIGURATION & FLT CONDITION	
○	35	2640	101.3 (AFT)	5100	CLEAN	LEVEL
□	77	2640	101.3 (AFT)	5500	CLEAN	LEVEL
△	92.5	2630	101.3 (AFT)	5800	CLEAN	LEVEL
◇	0	2660	101.3 (AFT)	1600	CLEAN	HOVER (IGE)
⌂	48.5	2640	101.3 (AFT)	5000	CLEAN	CLIMB
▽	55.5	2620	101.2 (AFT)	5000	CLEAN	AUTO

SAS ON 368 ROTOR RPM

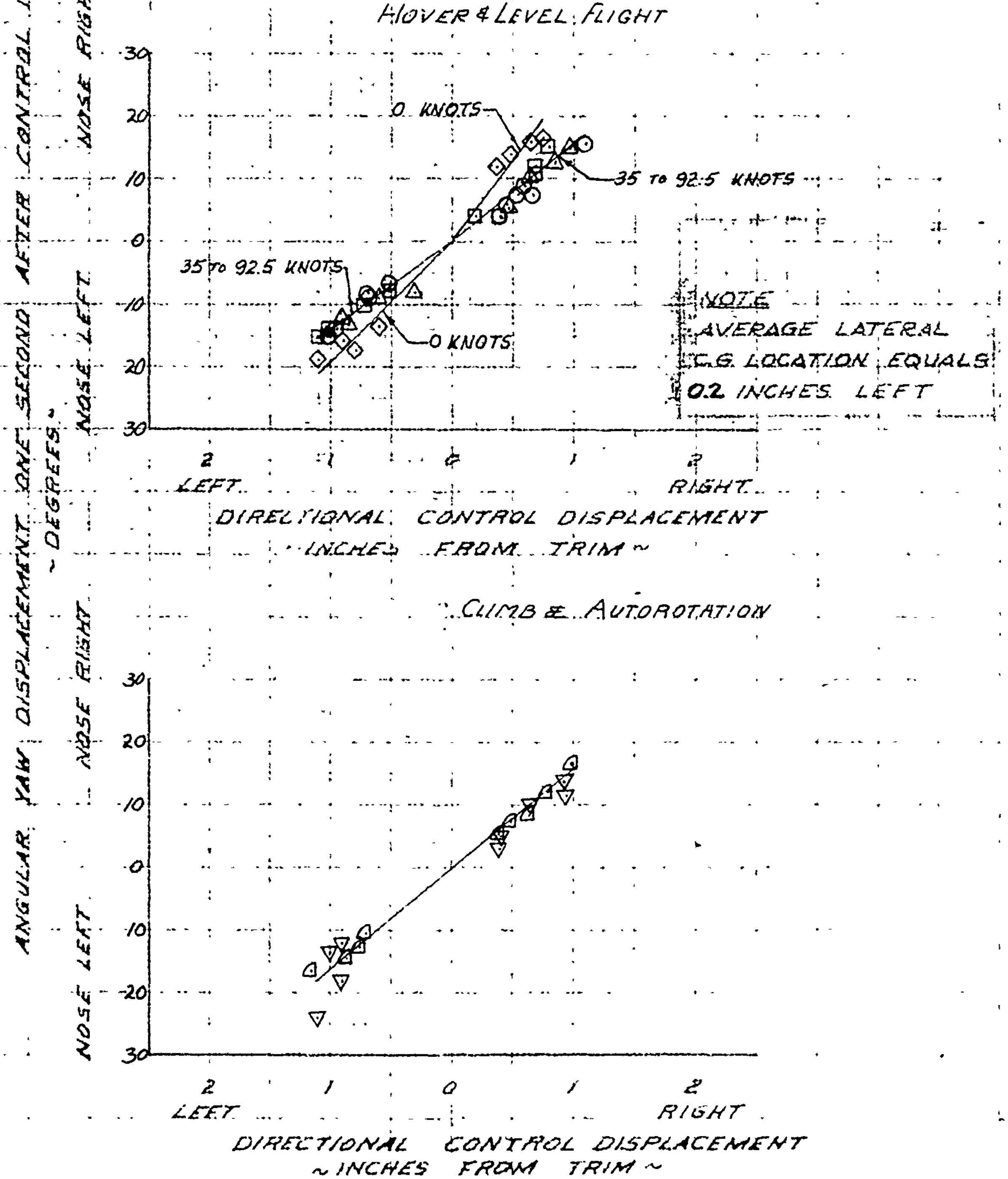


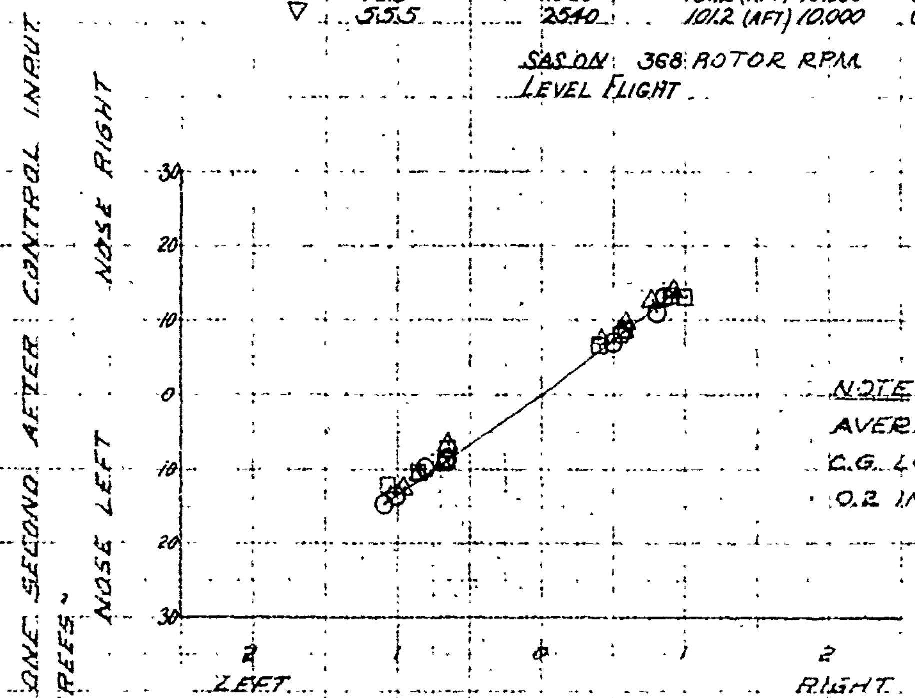
FIGURE No. 185

ANGULAR YAW DISPLACEMENT
OH-5A   USA S/N. 62-4210

SYM	CAS ~KNOTS~	AVG GW. ~LB	AVG CG ~IN~	AVG H_p ~FT~	CONFIGURATION & FLT CONDITION	
○	35	2690	101.3 (AFT)	9900	CLEAN	LEVEL
□	58	2630	101.3 (AFT)	9900	CLEAN	LEVEL
△	75	2640	101.3 (AFT)	10300	CLEAN	LEVEL
◺	48.5	2550	101.2 (AFT)	10,000	CLEAN	CLIMB
▽	55.5	2540	101.2 (AFT)	10,000	CLEAN	AUTO

SAS ON: 368 ROTOR RPM

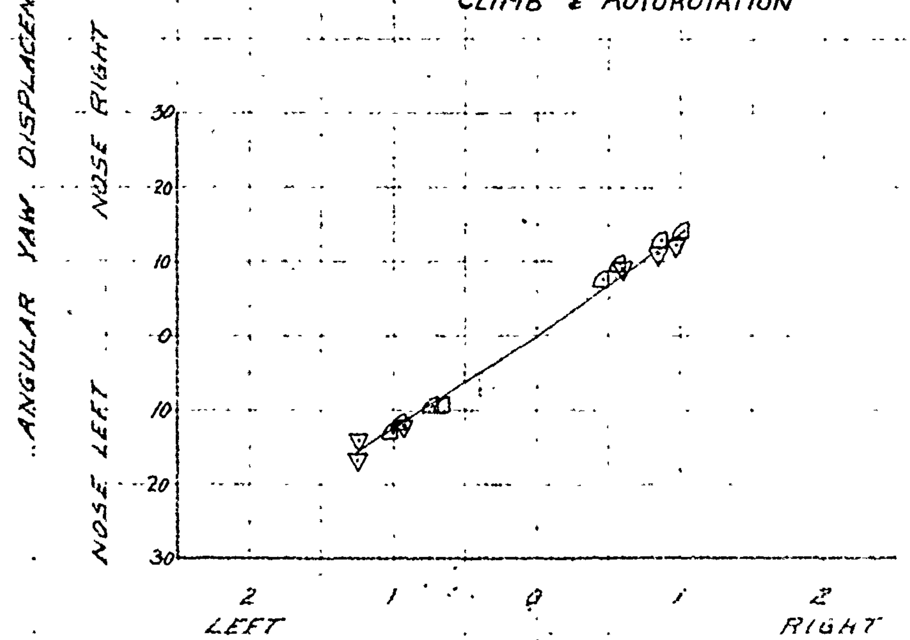
LEVEL FLIGHT



DIRECTIONAL CONTROL DISPLACEMENT
~INCHES FROM TRIM~

NOTE
AVERAGE LATERAL C.G. LOCATION EQUALS 0.2 INCHES LEFT

CLIMB & AUTOROTATION



DIRECTIONAL CONTROL DISPLACEMENT
~INCHES FROM TRIM~

FIGURE NO. 186

ANGULAR YAW DISPLACEMENT

OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG GW ~LB~	AVG CG ~IN~	AVG H_p ~FT~	CONFIGURATION	
○	35	2640	95.4 (FWD)	5900	CLEAN	LEVEL
□	77	2650	95.4 (FWD)	5600	CLEAN	LEVEL
△	93.5	2660	95.4 (FWD)	4900	CLEAN	LEVEL
◇	0	2730	95.4 (FWD)	1200	CLEAN	HOVER (IGE)
⌂	48.5	2670	95.4 (FWD)	5000	CLEAN	CLIMB
▽	55.5	2650	95.4 (FWD)	5000	CLEAN	AUTO

SAS ON 368 ROTOR RPM.

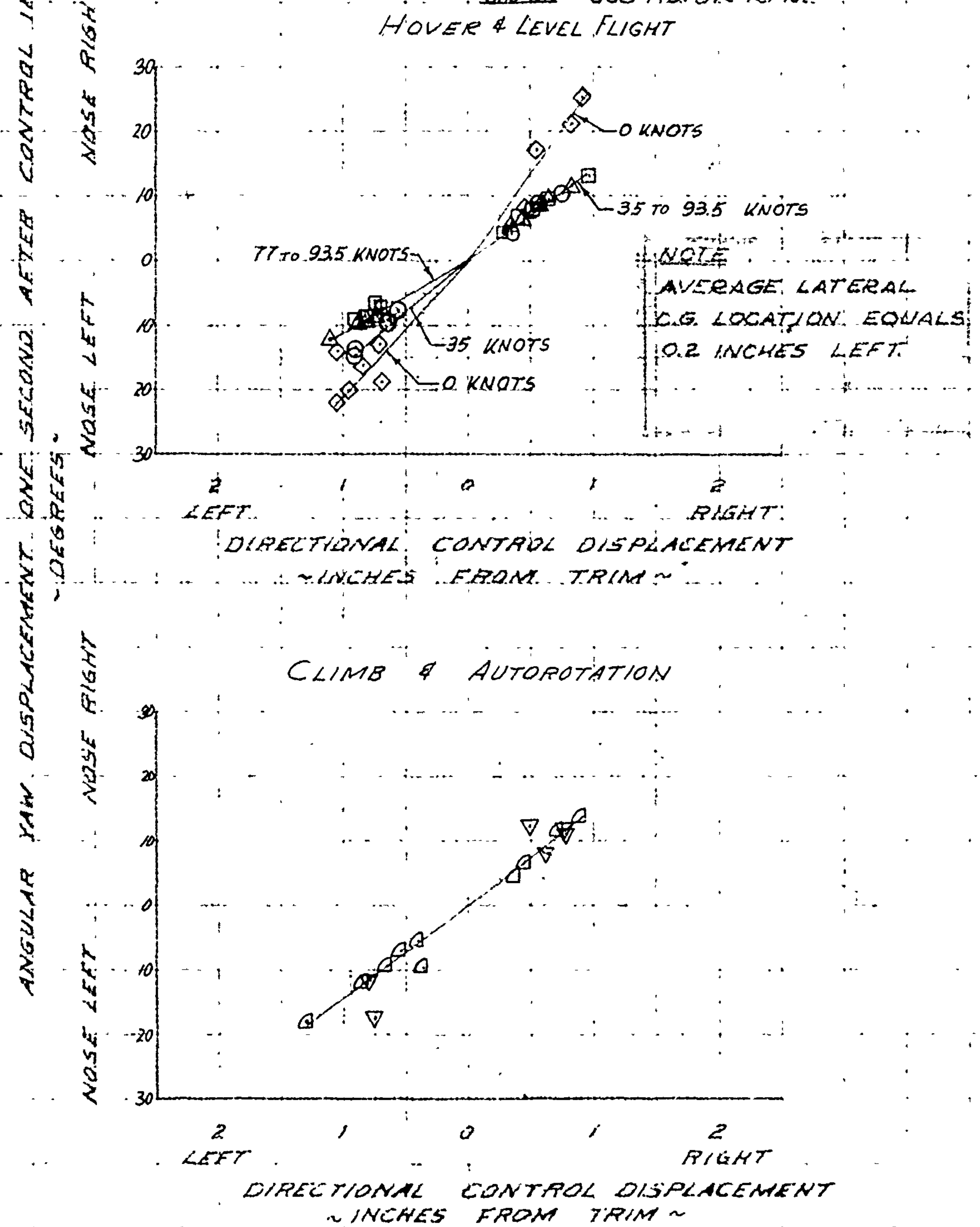


FIGURE No. 187

ANGULAR YAW DISPLACEMENT

OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG GW ~LB	AVG CG ~IN~	AVG H_p ~FT~	CONFIGURATION & FLT CONDITION	
○	35	3000	95.7 (FWD)	4900	CLEAN	LEVEL
□	66	2950	95.5 (FWD)	4900	CLEAN	LEVEL
△	83	2900	95.4 (FWD)	5100	CLEAN	LEVEL
⌂	48.5	2925	95.4 (FWD)	5000	CLEAN	CLIMB
▽	55.5	2900	95.4 (FWD)	5000	CLEAN	AUTO

368 ROTOR RPM

SAS ON

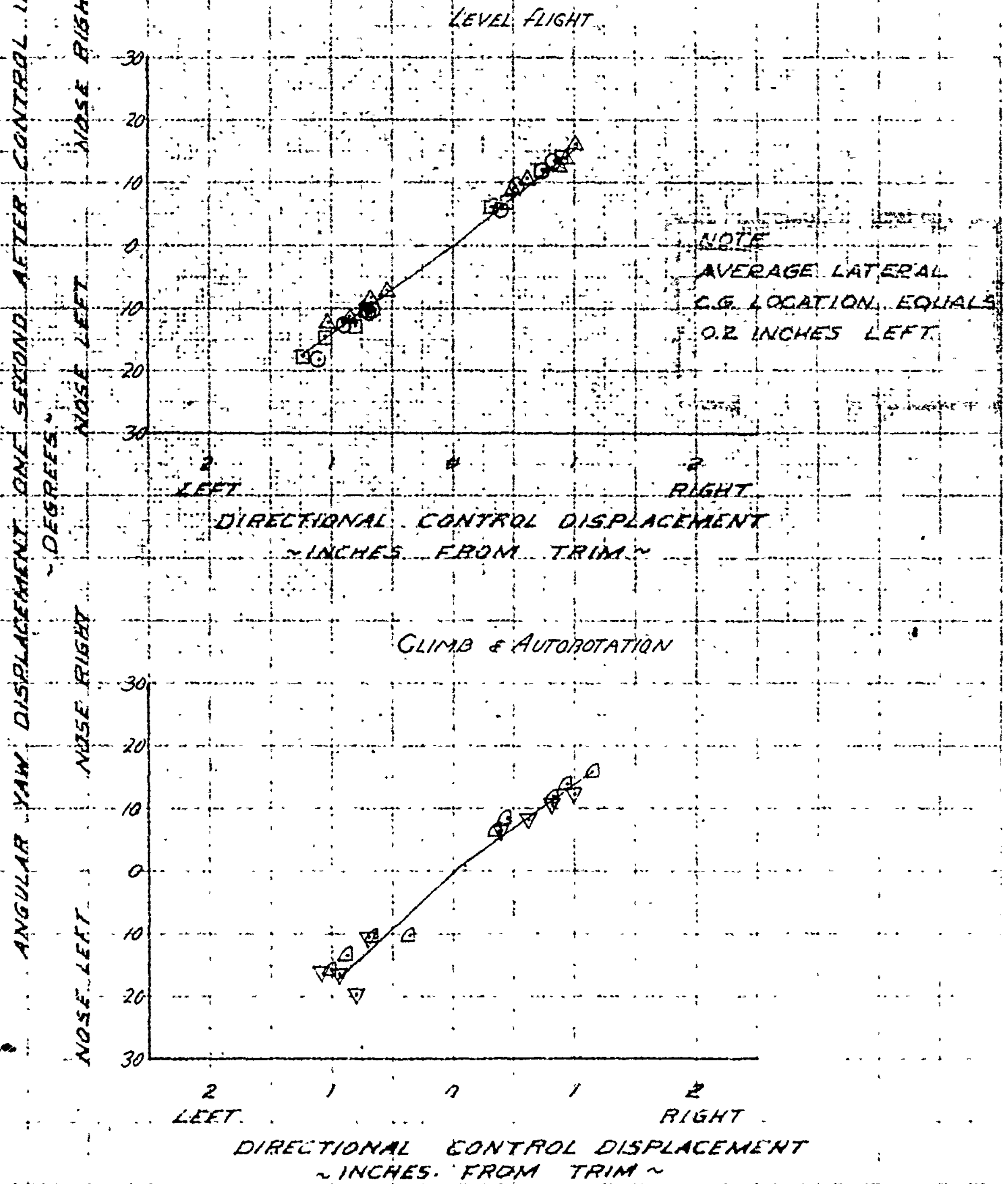


FIGURE No. 188

ANGULAR YAW DISPLACEMENT

OH-5A USA S/N.

SYM	CAS ~KNOTS~	AVG GW ~LB	AVG CG ~IN~	AVG H_o ~FT~	CONFIGURATION	& FLT CONDITION
○	35	2630	101.1 (AFT)	4900	XM-7	LEVEL
□	76	2620	101.1 (AFT)	4900	XM-7	LEVEL
◿	48.5	2560	101.0 (AFT)	5000	XM-7	CLIMB
▽	55.5	2540	101.0 (AFT)	5000	XM-7	AUTO

SAS ON 368 ROTOR RPM

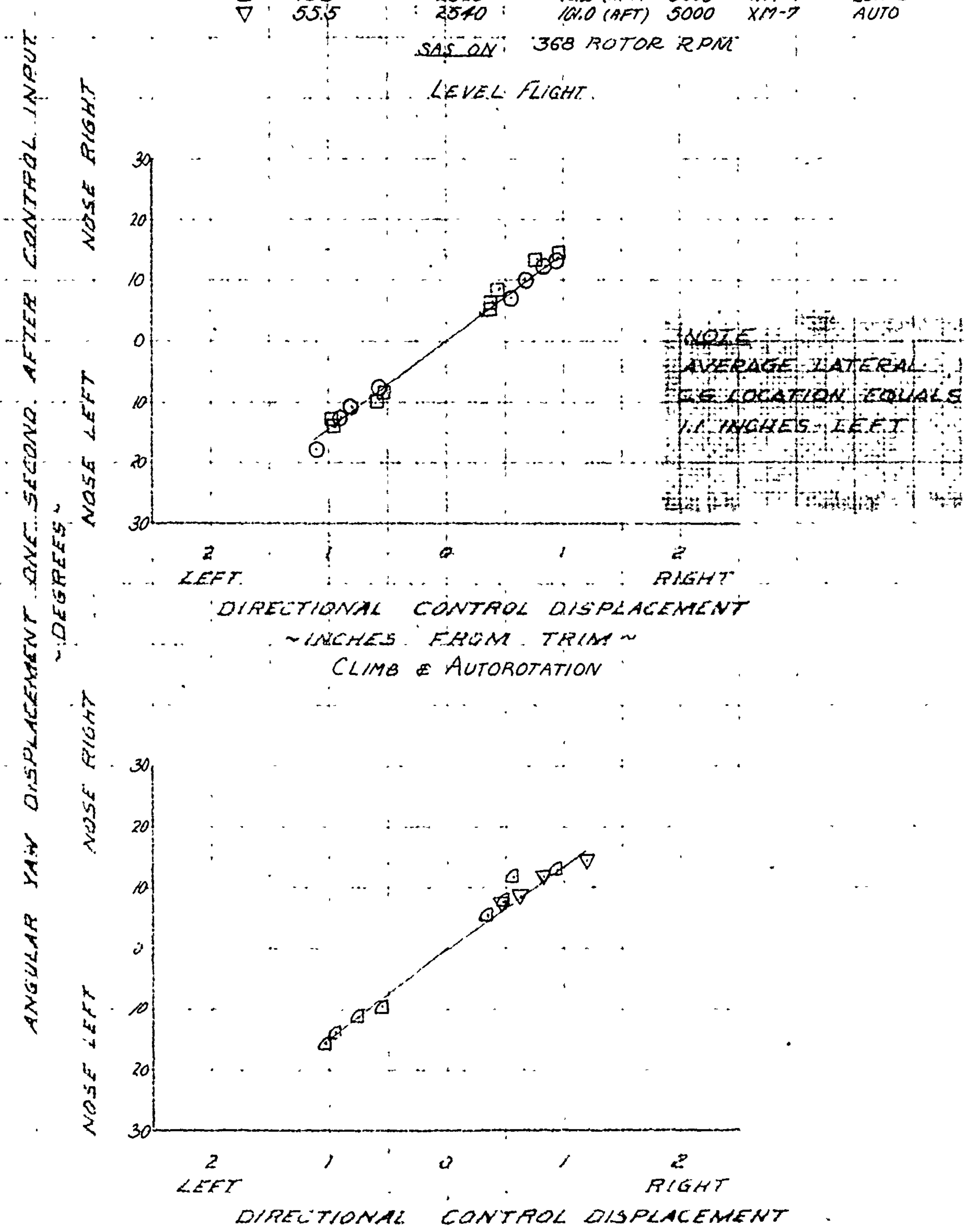


FIGURE NO. 189

ANGULAR YAW DISPLACEMENT

OH-5A USA S/N 62-4210

SYM	CAS ~KNOTS~	AVG GW ~LB	AVG CG ~IN~	AVG H_p ~FT~	CONFIGURATION & FLT CONDITION	
○	35	2720	101.2 (AFT)	5000	XM-8	LEVEL
□	77	2650	101.2 (AFT)	5100	XM-8	LEVEL
◇	0	2700	101.3 (AFT)	1600	XM-8	HOVER (IGE)
△	48.5	2660	101.1 (AFT)	5000	XM-8	CLIMB
▽	55.5	2640	101.1 (AFT)	5000	XM-8	AUTO

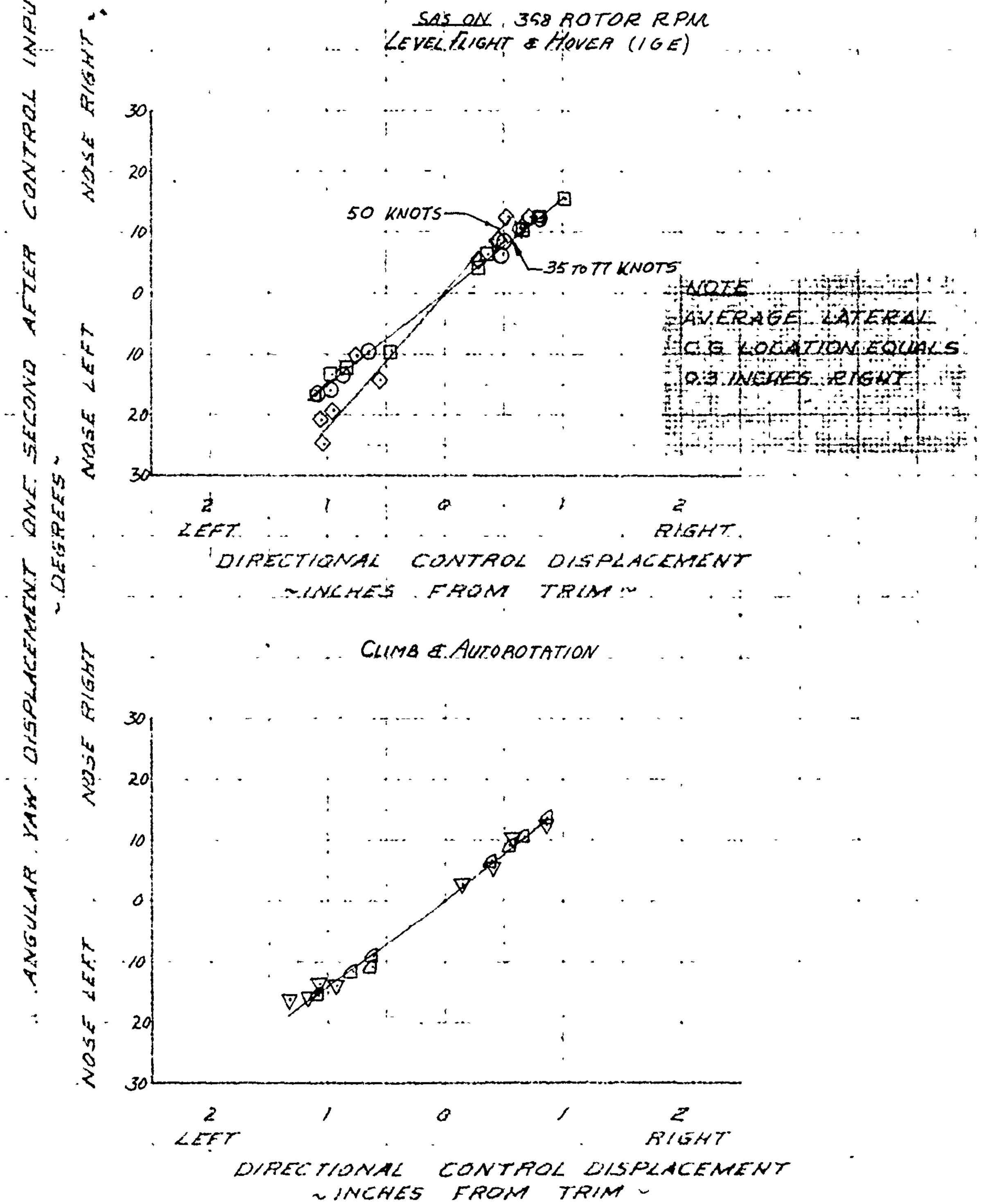


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FIGURE NO. 190

ANGULAR YAW DISPLACEMENT

OH-5A USA S/N 62-4209

SYM	CAS ~KNOTS~	AVG GW ~LB	AVG CG ~IN~	AVG H_p ~FT~	CONFIGURATION & FLT CONDITION	
○	35	2690	101.4 (AFT)	5500	CLEAN	LEVEL
□	79	2660	101.4 (AFT)	5800	CLEAN	LEVEL
▽	55.5	2690	101.4 (AFT)	5000	CLEAN	AUTO

360 ROTOR RPM

SAS OFF

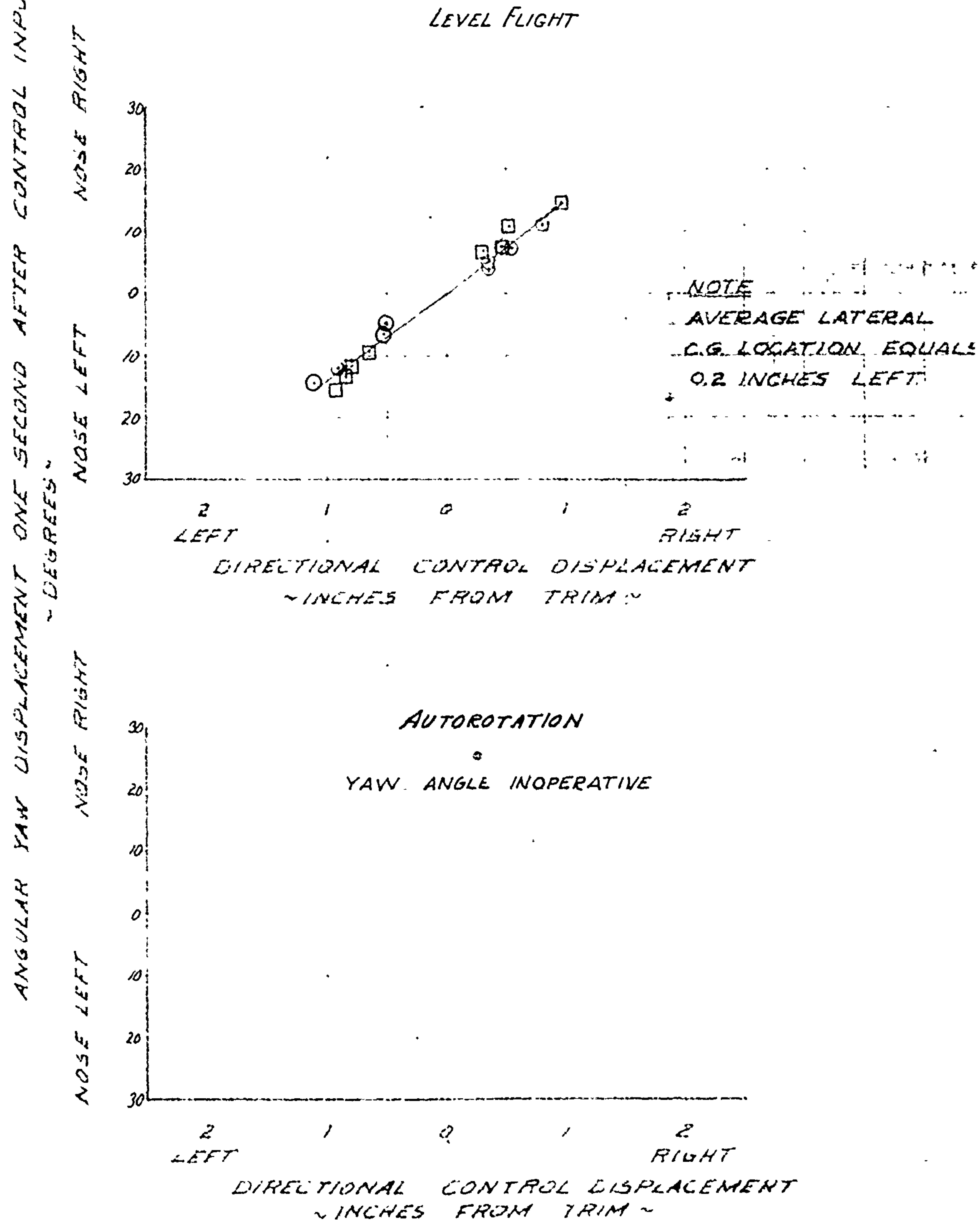


FIGURE NO. 191

AFT LONGITUDINAL STEP

CH-5A, U.S.A., S/N 62-4210

CONFIGURATION : CLEAN
FULL LONGITUDINAL TRAVEL : 10.3 INCHES
AVERAGE GROSS WEIGHT : 2660 LBS.
LONG C.G. LOCATION : 101.3 INCHES (AFT)
LATERAL C.G LOCATION : 0.2 IN. (LT.)

FLIGHT CONDITION : LEVEL FLIGHT
TRIM CAS : 78 KNOTS
DENSITY ALTITUDE : 5800 FEET
ROTOR SPEED : 368 RPM
SAS CONDITION : ON

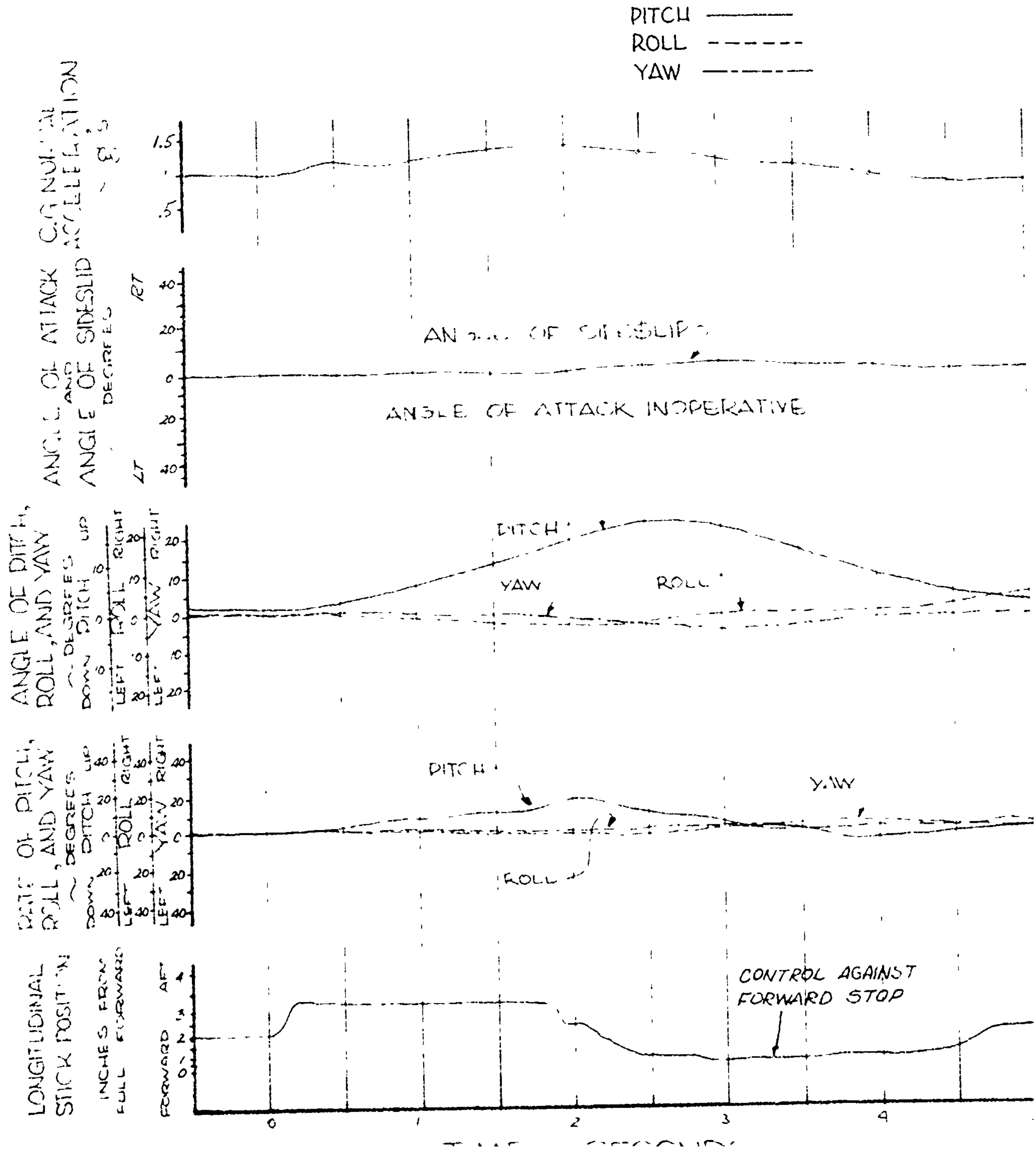


FIGURE NO. 192

AFT LONGITUDINAL STEP

OH-5A, U.S.A., S/N 62-4209

CONFIGURATION: CLEAN	FLIGHT CONDITION: CLIMB(MAX CONT.POW
FULL LONGITUDINAL TRAVEL: 10.3 INCHES	TRIM CAS: 47 KNOTS
AVERAGE GROSS WEIGHT: 2760 LBS.	DENSITY ALTITUDE: 5700 FEET
LONG C.G. LOCATION: 101.4 INCHES(AFT)	ROTOR SPEED: 368 RPM
LATERAL C.G. LOCATION: 0.2 IN.(LT.)	SAS CONDITION: OFF

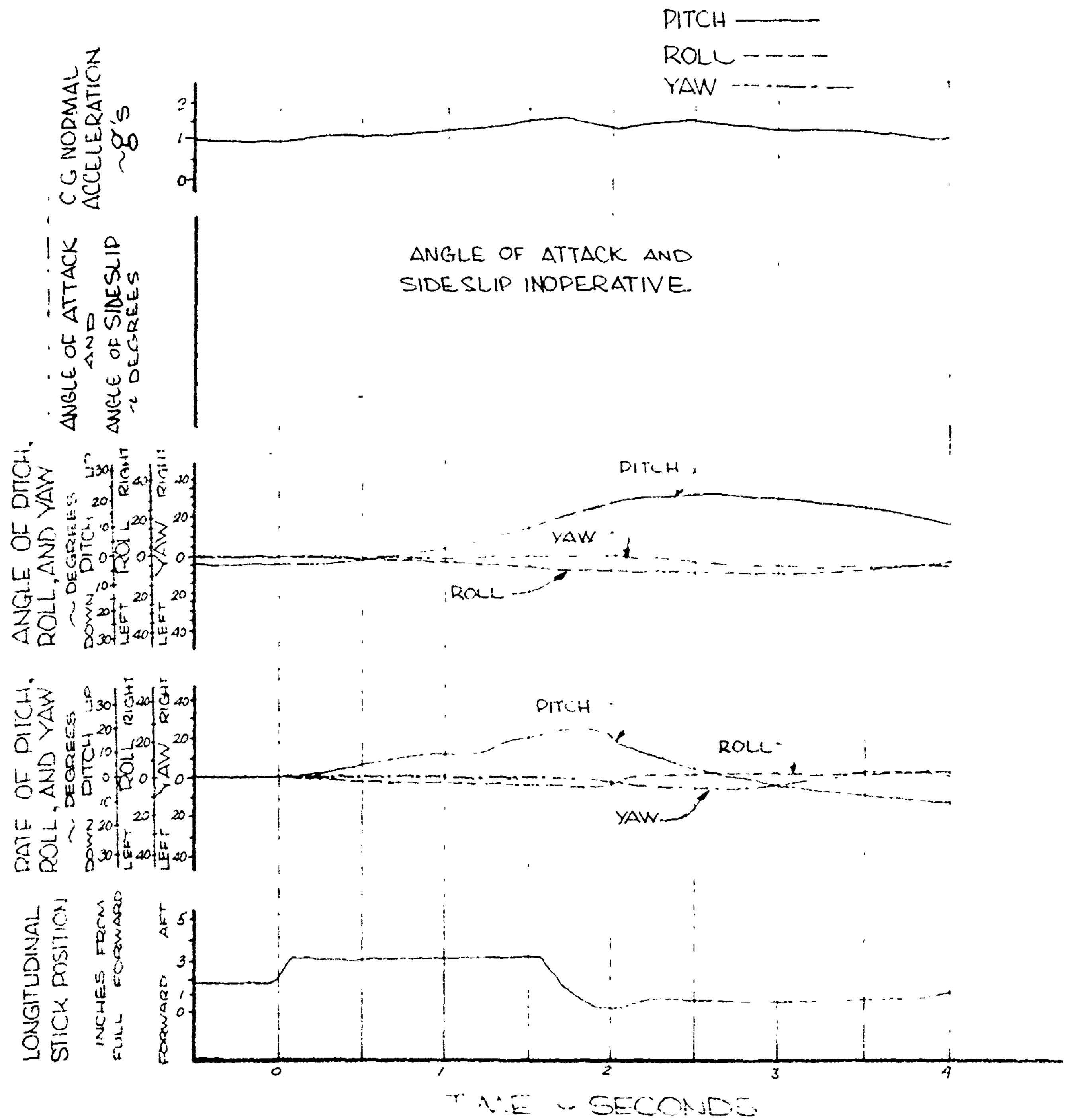


FIGURE NO. 193

RIGHT LATERAL STEP

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION: CLEAN
FULL LATERAL TRAVEL: 10.3 INCHES
AVERAGE GROSS WEIGHT: 2760 LBS.
LONG. C.G. LOCATION: 101.4 INCHES (AFT)
LATERAL C.G. LOCATION: 0.2 IN. (LT)

FLIGHT CONDITION: CLIMB (MAX CONT)
TRIM CAS: 48 KNOTS
DENSITY ALTITUDE: 5680 FEET
ROTOR SPEED: 368 RPM
SAS CONDITION: OFF

PITCH ———
ROLL - - - - - -
YAW -·-·-·-

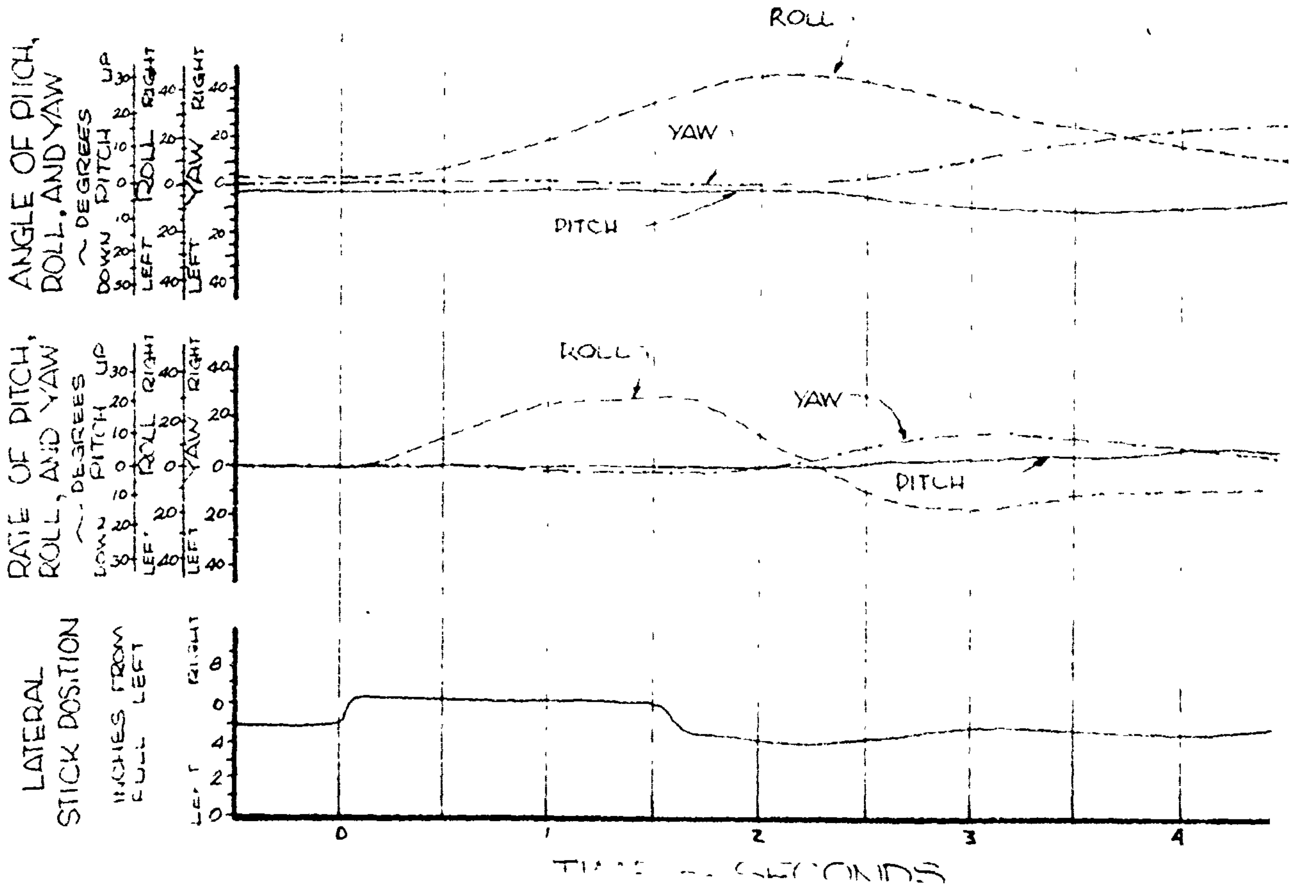


FIGURE NO. 194

RIGHT DIRECTIONAL STEP

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION: XM-7
FULL PEDAL TRAVEL: 4.5 INCHES
AVERAGE GROSS WEIGHT: 2620 LBS.
LONG. C.G. LOCATION: 101.2 INCHES (AFT)
LATERAL C.G. LOCATION: 1.1 IN. (LT.)

FLIGHT CONDITION: LEVEL FLIGHT
TRIM CAS: 77 KNOTS
DENSITY ALTITUDE: 4500 FEET
ROTOR SPEED: 368 RPM
SAS CONDITION: ON

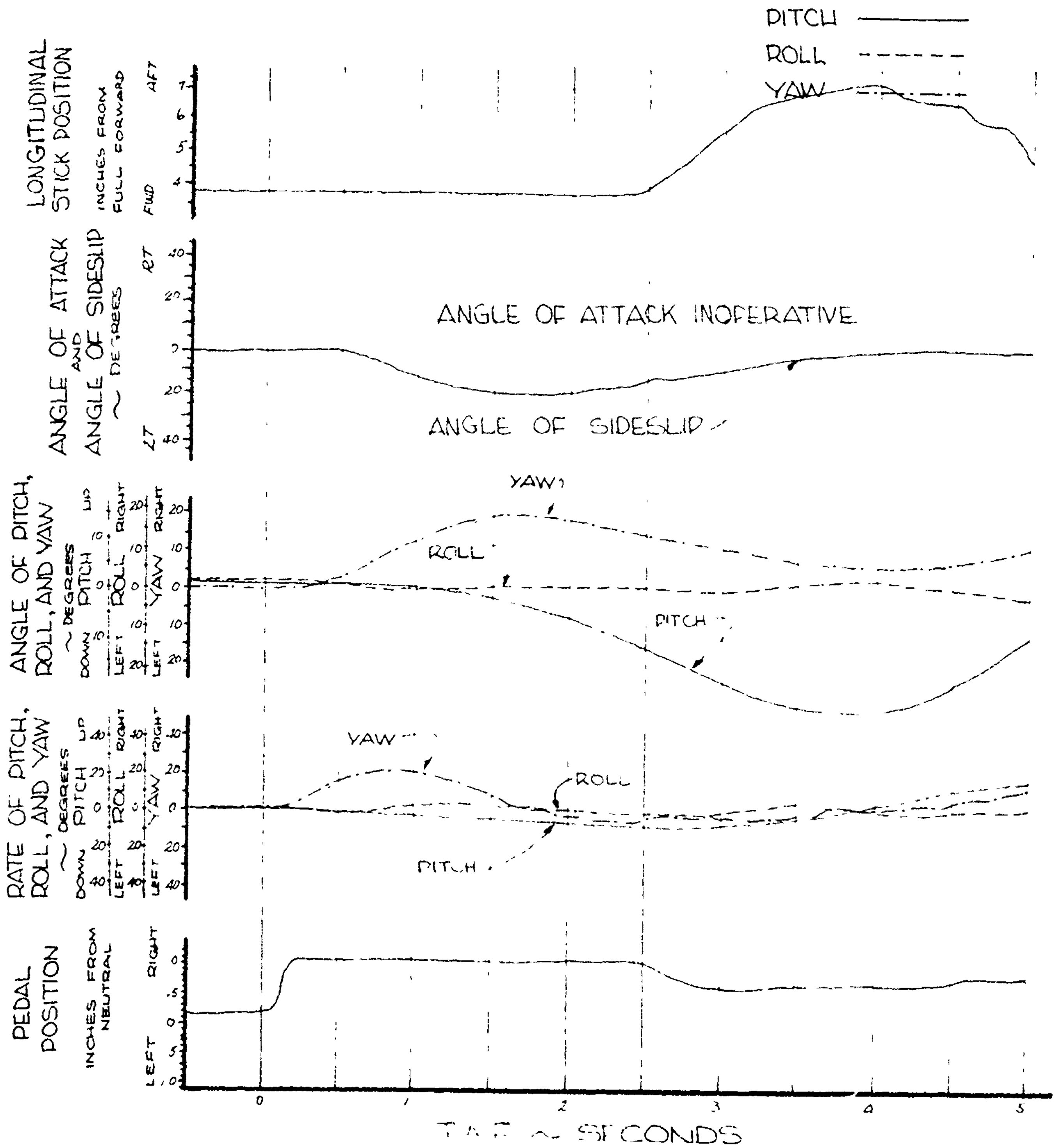


FIGURE NO. 195

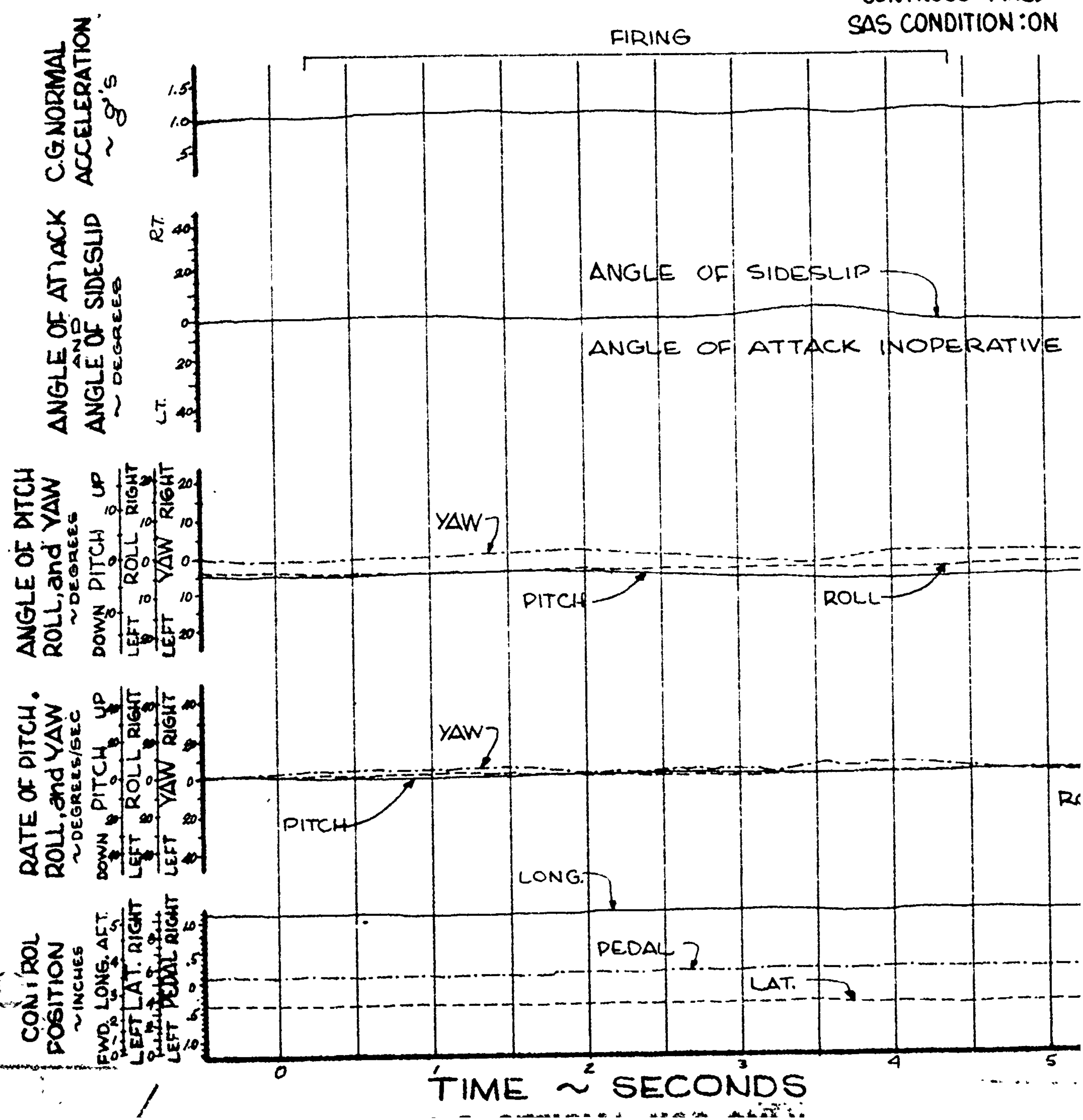
TIME HISTORY OF ARMAMENT FIRING

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION: XM-7 (FULL-UP ELEVATION) FLIGHT CONDITION: LEVEL FLIGHT
AVERAGE GROSS WEIGHT: 2600 LBS. TRIM CAS: 84 KNOTS
LONG. C.G. LOCATION: 95.7 INCHES (FWD) DENSITY ALTITUDE: 3500 FEET
LATERAL C.G. LOCATION: 1.2 IN. (LT.) ROTOR SPEED: 368 RPM

PITCH ——— and LONG. STICK
ROLL - - - - and LAT. STICK
YAW -·-·- and PEDAL

CONTROLS FIXED
SAS CONDITION: ON



NO. 195

ARMAMENT FIRING

A., S/N 62-4210

LEVATION FLIGHT CONDITION: LEVEL FLIGHT

LBS. TRIM CAS: 84 KNOTS

S(FWD) DENSITY ALTITUDE: 3500 FEET

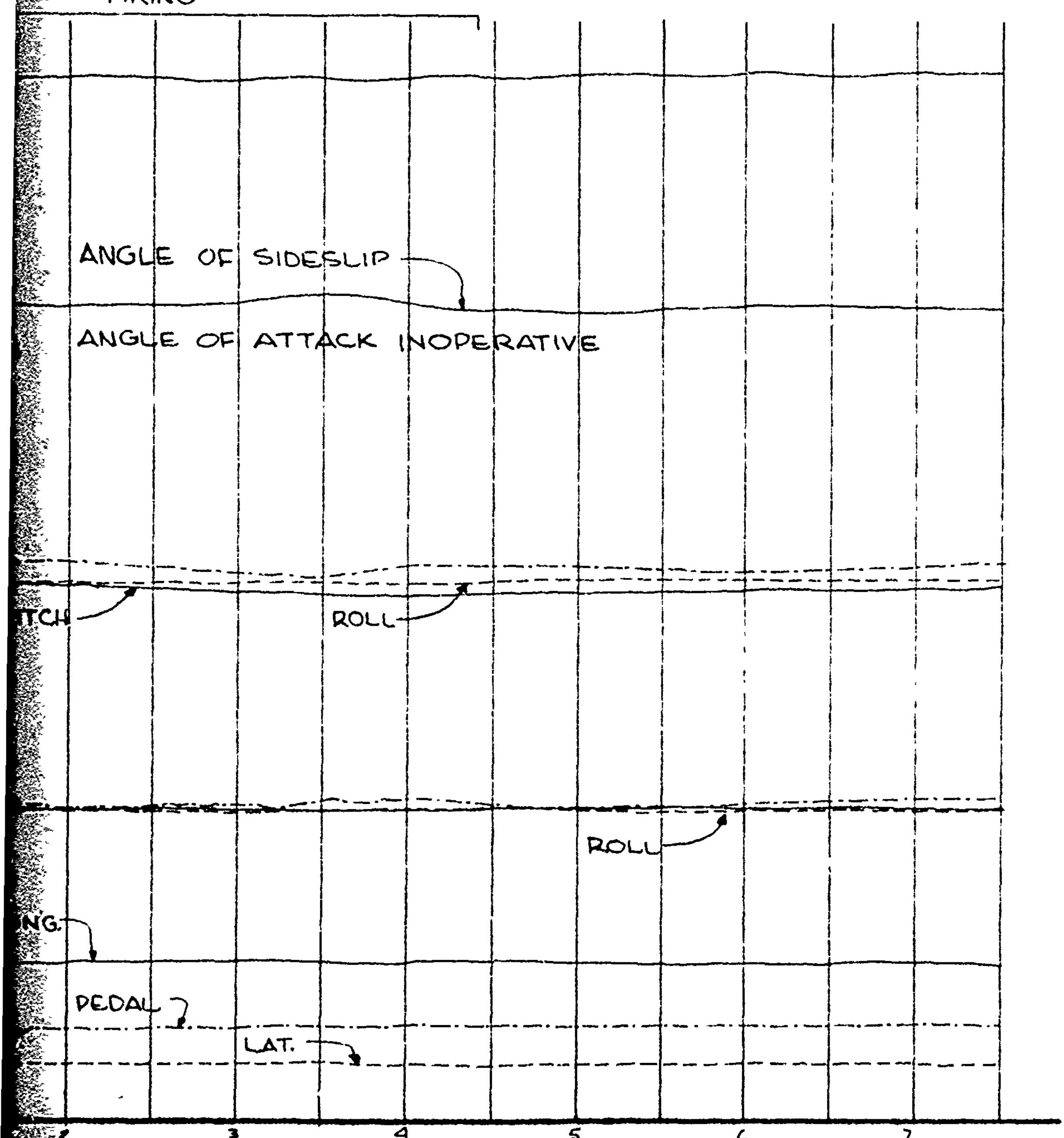
(LT.) ROTOR SPEED: 368 RPM

-- YAW -----

CK and PEDAL

CONTROLS FIXED

SAS CONDITION: ON



~ SECONDS

2

FIGURE NO. 196

TIME HISTORY OF ARMAMENT FIRING

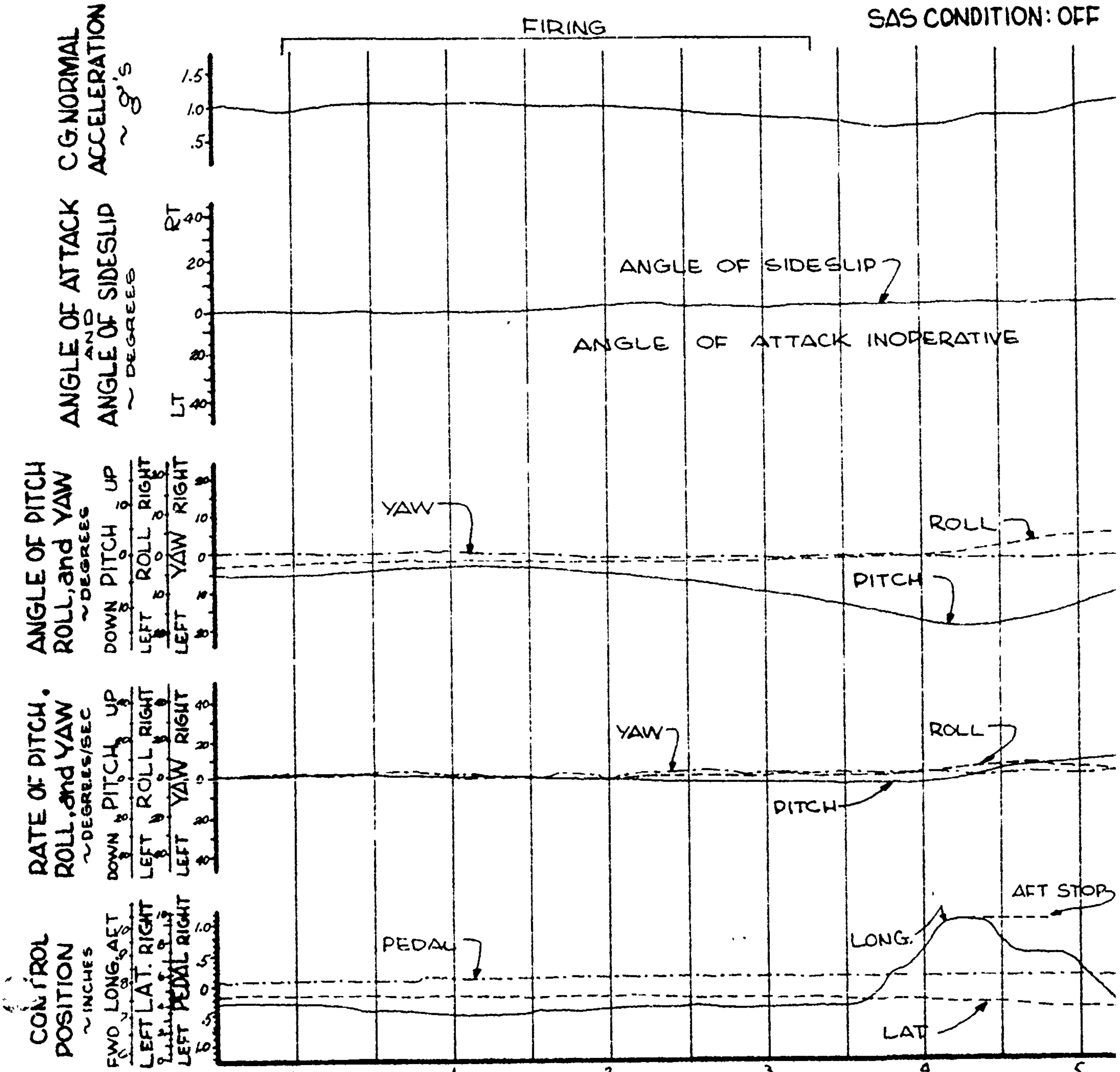
OH-5A, U.S.A., S/N 62-4210

CONFIGURATION: XM-7 (FULL-UP ELEVATION)
AVERAGE GROSS WEIGHT: 2550 LBS.
LONG. C.G. LOCATION: 95.5 INCHES (FWD)
LATERAL C.G. LOCATION: 1.2 IN. (LT.)

FLIGHT CONDITION: LEVEL FLIGHT
TRIM CAS: 84 KNOTS
DENSITY ALTITUDE: 3500 FEET
ROTOR SPEED: 368 RPM

PITCH ——— and LONG. STICK
ROLL – – – – and LAT. STICK
YAW — - — - — and PEDAL

CONTROLS FIXED
SAS CONDITION: OFF



TIME ~ SECONDS

FOR OFFICIAL USE ONLY

JRE NO.196

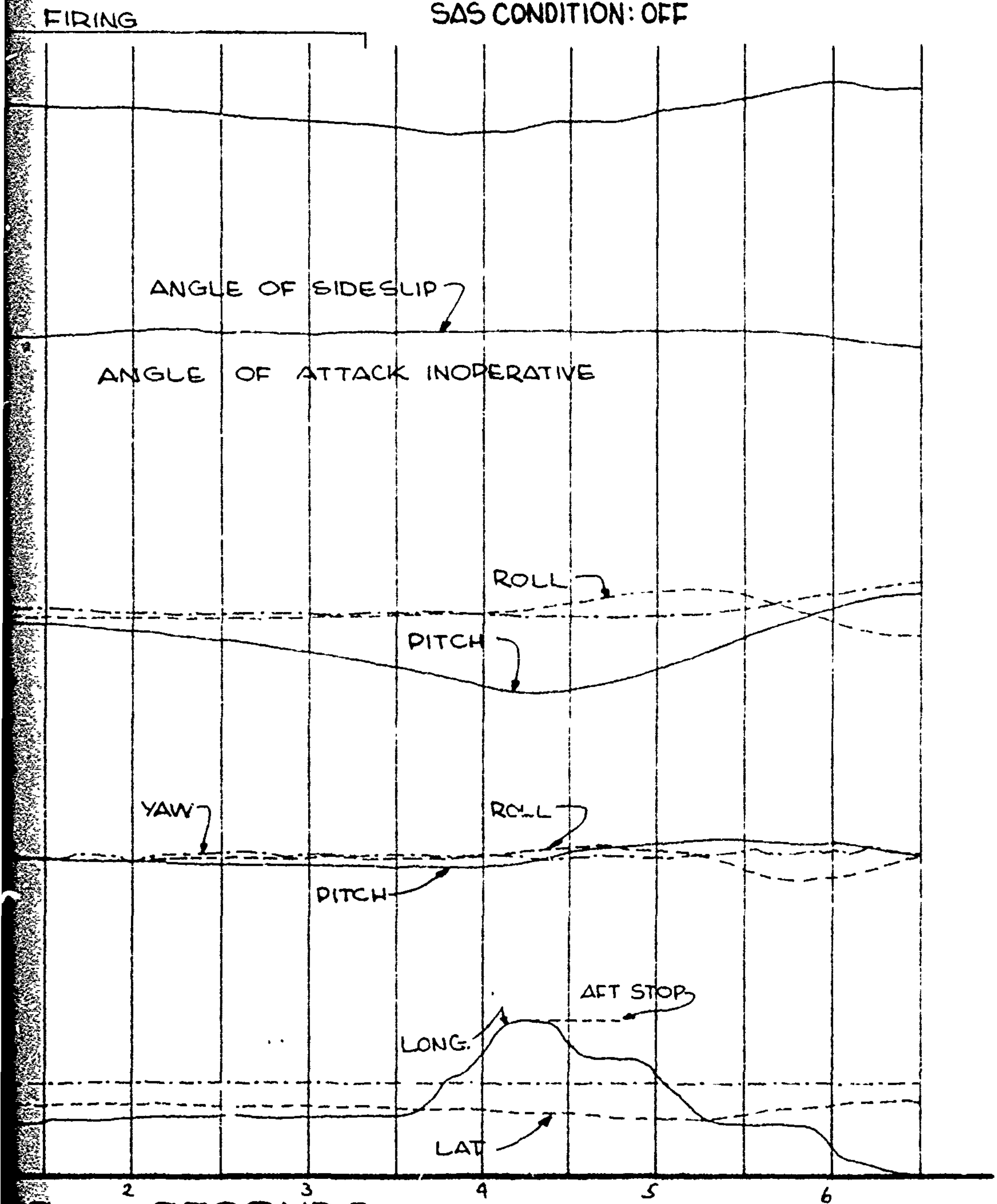
OF ARMAMENT FIRING

J.S.A., S/N 62-4210

L-UP ELEVATION) FLIGHT CONDITION: LEVEL FLIGHT
2550 LBS. TRIM CAS: 84 KNOTS
INCHES(FWD) DENSITY ALTITUDE: 3500 FEET
2. IN.(LT.) ROTOR SPEED: 368 RPM

YAW
T STICK and PEDAL

CONTROLS FIXED
SAS CONDITION: OFF



E ~ SECONDS

OFFICIAL USE ONLY

2

FIGURE NO.197

TIME HISTORY OF ARMAMENT FIRING

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION: XM-8(FULL-UP ELEVATION) FLIGHT CONDITION: SLIGHT DESCENT(200 FEET PE
AVERAGE GROSS WEIGHT: 2600 LBS. TRIM CAS: 91 KNOTS
LONG. C.G. LOCATION: 95.8 INCHES(FWD) DENSITY ALTITUDE: 3600 FEET
LATERAL C.G. LOCATION: 1.0 IN.(RT.) ROTOR SPEED: 368 RPM

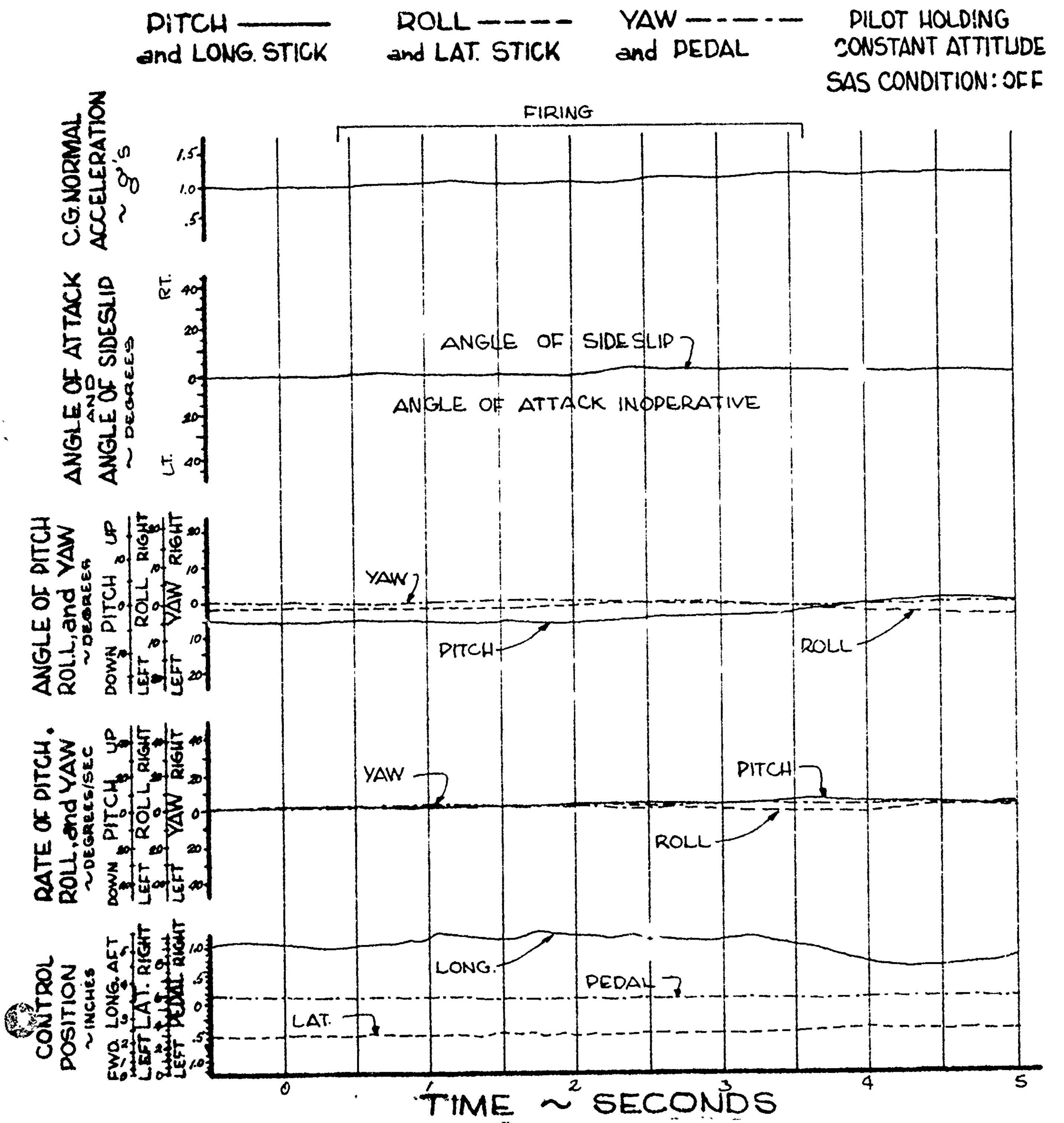


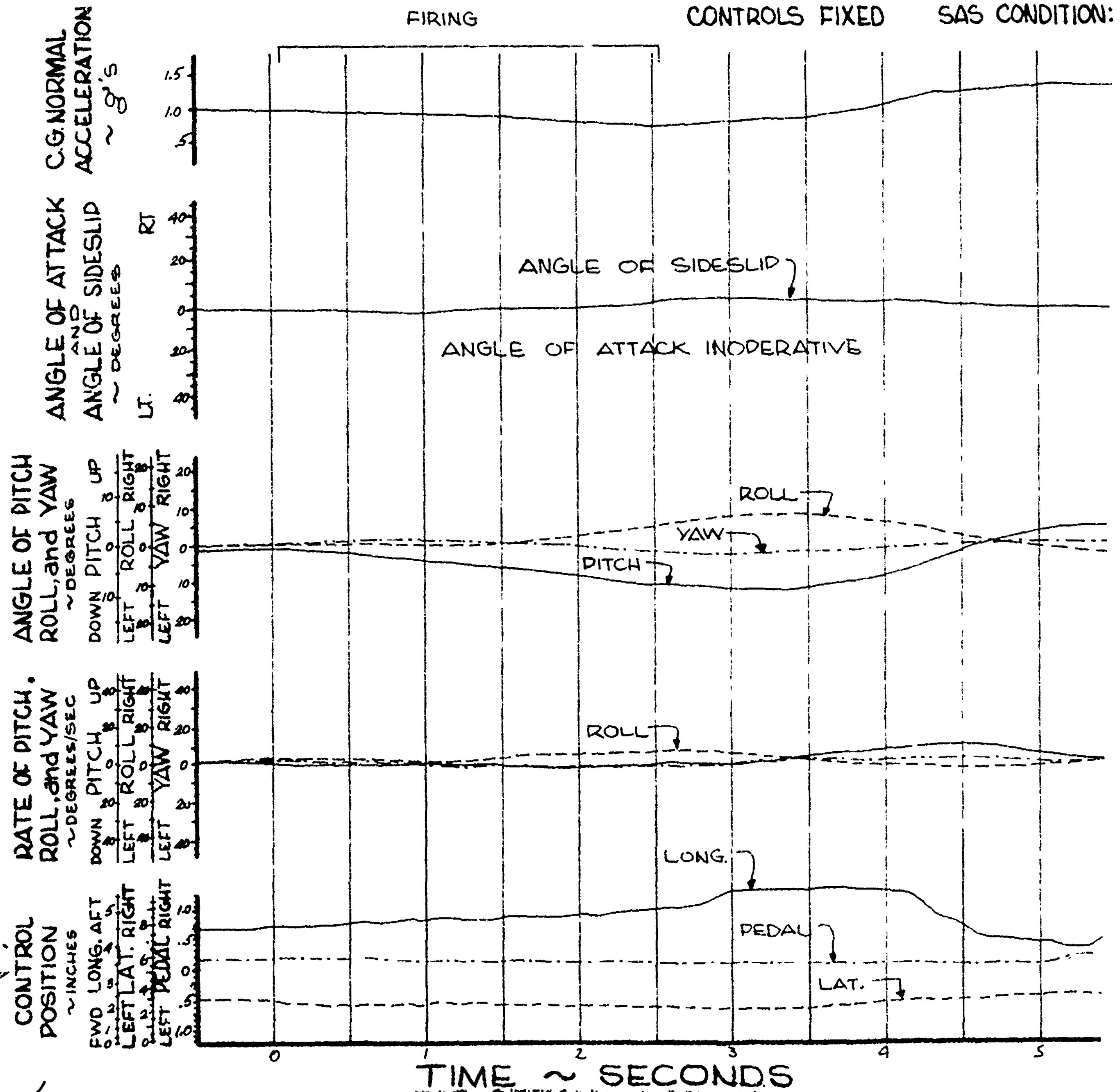
FIGURE NO. 198

TIME HISTORY OF ARMAMENT FIRING

OH-5A, U.S.A., S/N 62-4210

CONFIGURATION: XM-8 (FULL-UP ELEVATION) FLIGHT CONDITION: SLIGHT DESCENT (200 F
AVERAGE GROSS WEIGHT: 2600 LBS. TRIM CAS: 93 KNOTS
LONG. C.G. LOCATION: 95.8 INCHES (FWD) DENSITY ALTITUDE: 3600 FEET
LATERAL C.G. LOCATION: 1.0 IN. (RT.) ROTOR SPEED: 368 RPM

PITCH ——— and LONG. STICK
ROLL - - - - and LAT. STICK
YAW — - — - and PEDAL



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JRE NO.198

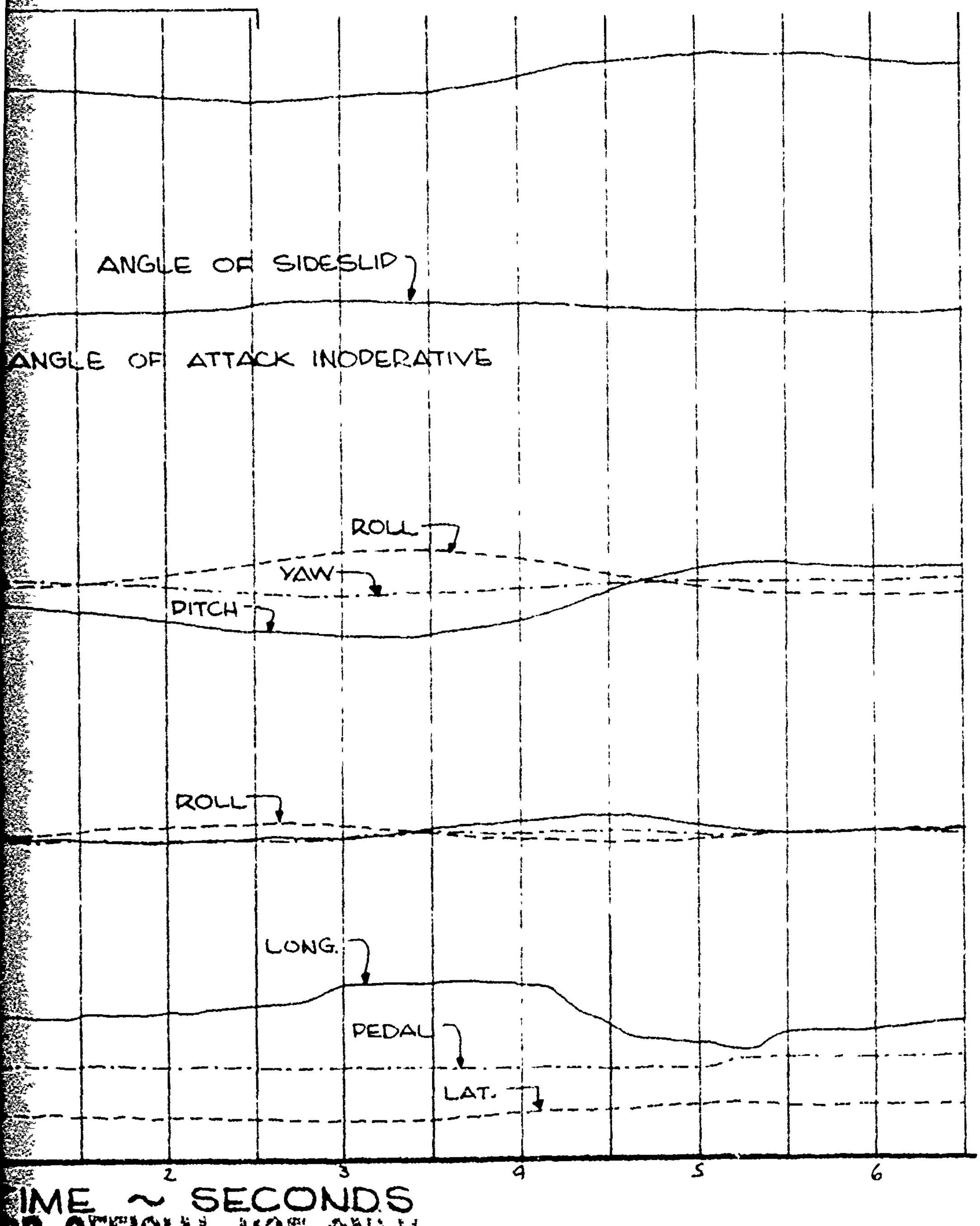
OF ARMAMENT FIRING

J.S.A., S/N 62-4210

LL·UP ELEVATION) FLIGHT CONDITION: SLIGHT DESCENT (200 FEET PER MIN.)
: 2600 LBS. TRIM CAS: 93 KNOTS
8 INCHES (FWD) DENSITY ALTITUDE: 3600 FEET
1.0 IN.(RT.) ROTOR SPEED: 368 RPM

LL ---- YAW -·-·-
AT. STICK and PEDAL

NG CONTROLS FIXED SAS CONDITION: OFF



2

FIGURE NO. 199

TIME HISTORY OF A THROTTLE CHOP

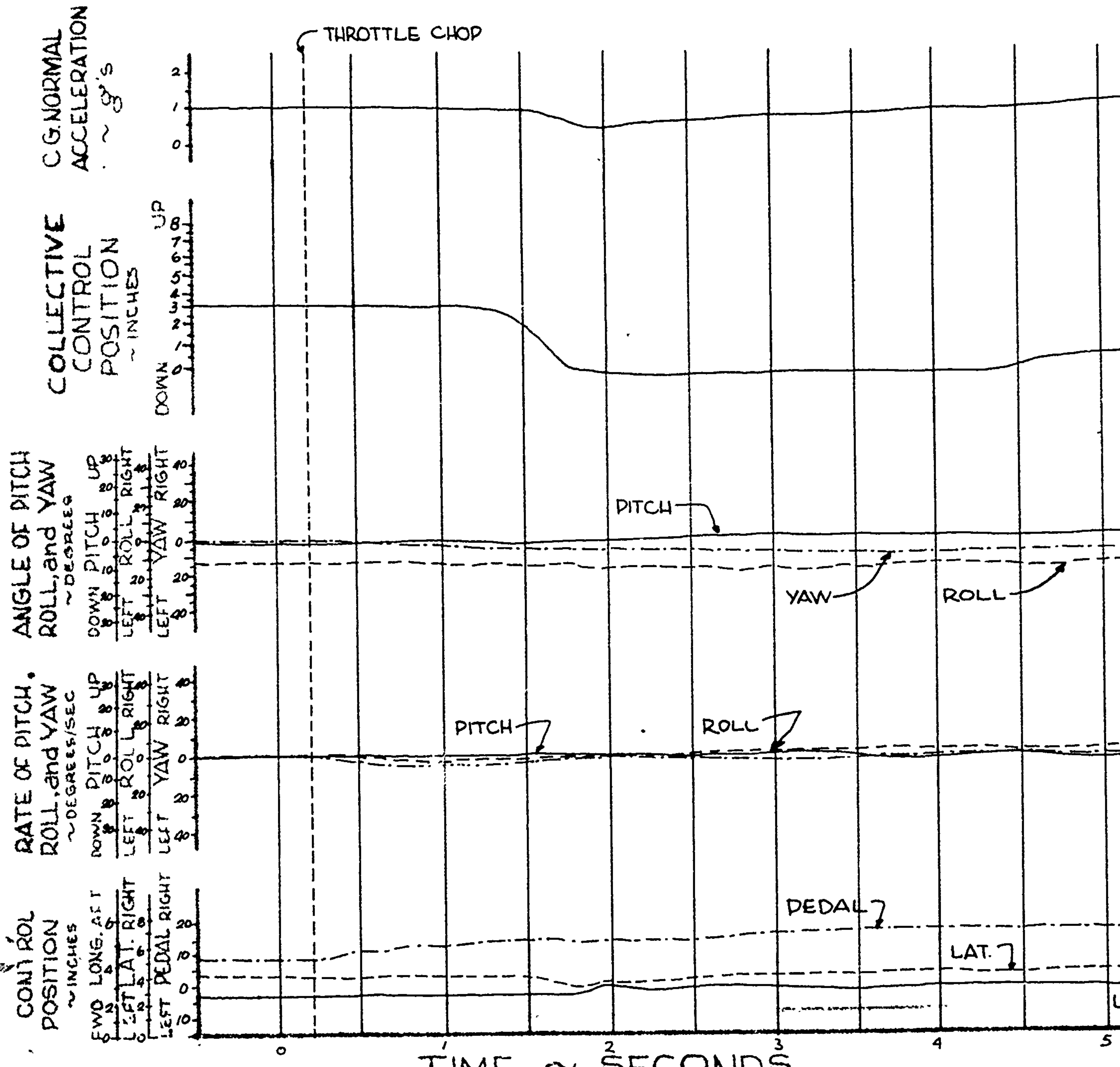
OH-5A, U.S.A., S/N 62-4209

CONFIGURATION: CLEAN
AVERAGE GROSS WEIGHT: 2960 LBS.
LONG. C.G. LOCATION: 101.4 INCHES (AFT)
LATERAL C.G. LOCATION: 0.2 IN. (LT.)

FLIGHT CONDITION: LEVEL FLIGHT
TRIM CAS: 64 KNOTS
DENSITY ALTITUDE: 4000 FEET
ROTOR SPEED: 368 RPM

PITCH ——— and LONG. STICK
ROLL - - - - and LAT. STICK
YAW — - — - — and PEDAL

SAS CONDITION: ON



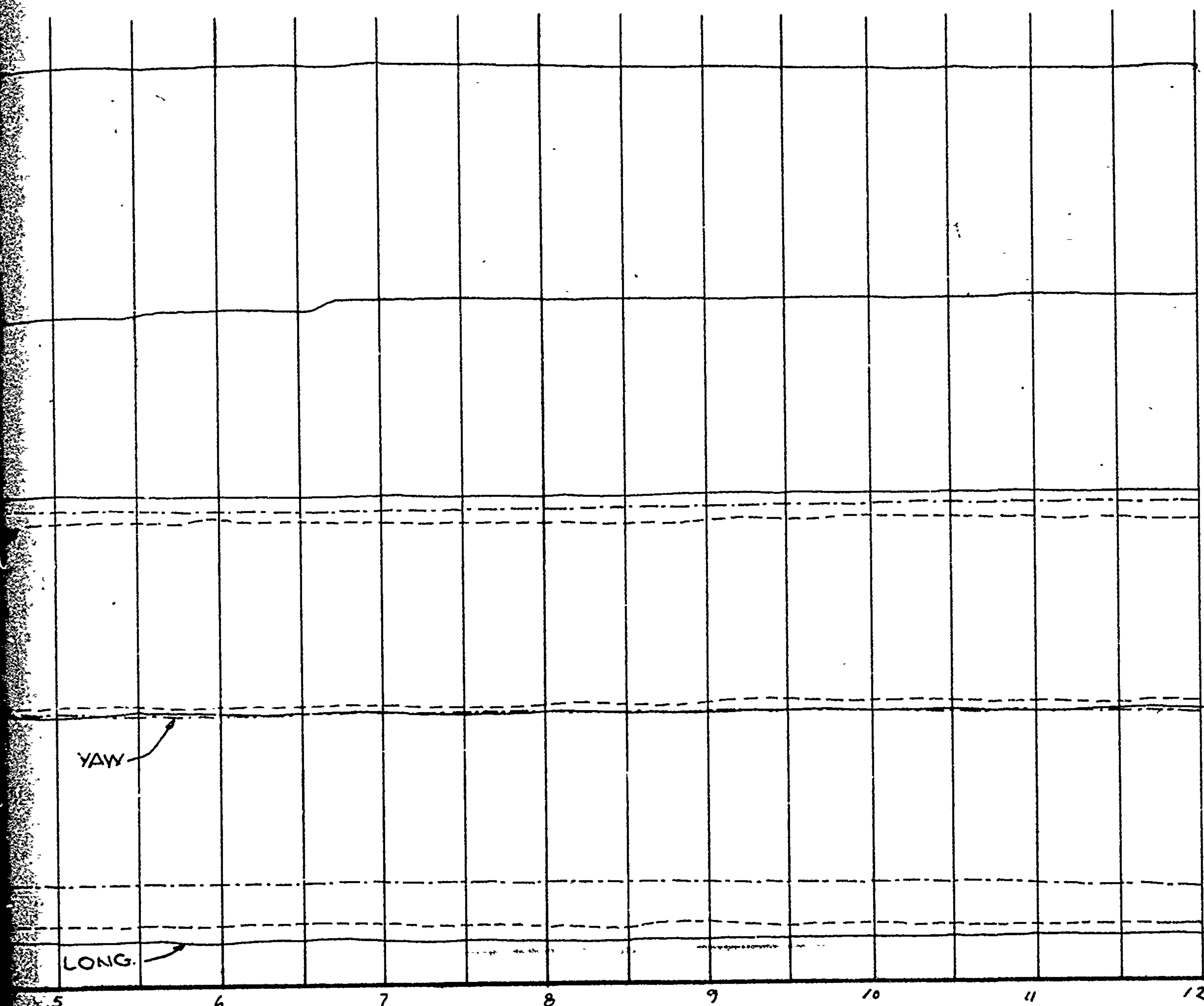

YAW
LONG.
5
6
7
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FIGURE No 20D

LONGITUDINAL CONTROL STOP VARIATION WITH PITCH ANGLE

OH-5A USA S/N 62-4210

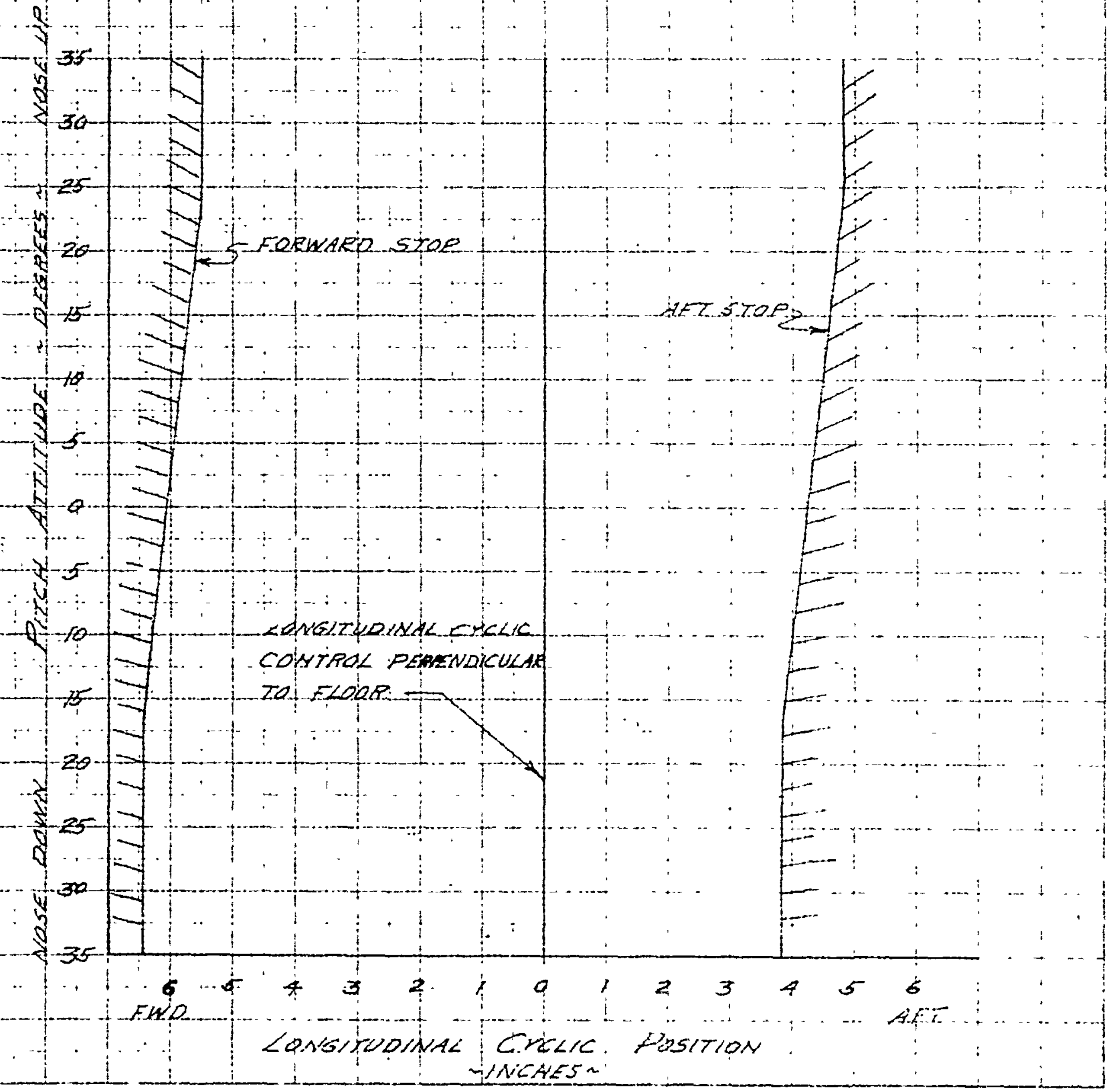


FIGURE No 201

CYCLIC CONTROL POSITION VS FORCE

OH-5A USA S/N 62-4207

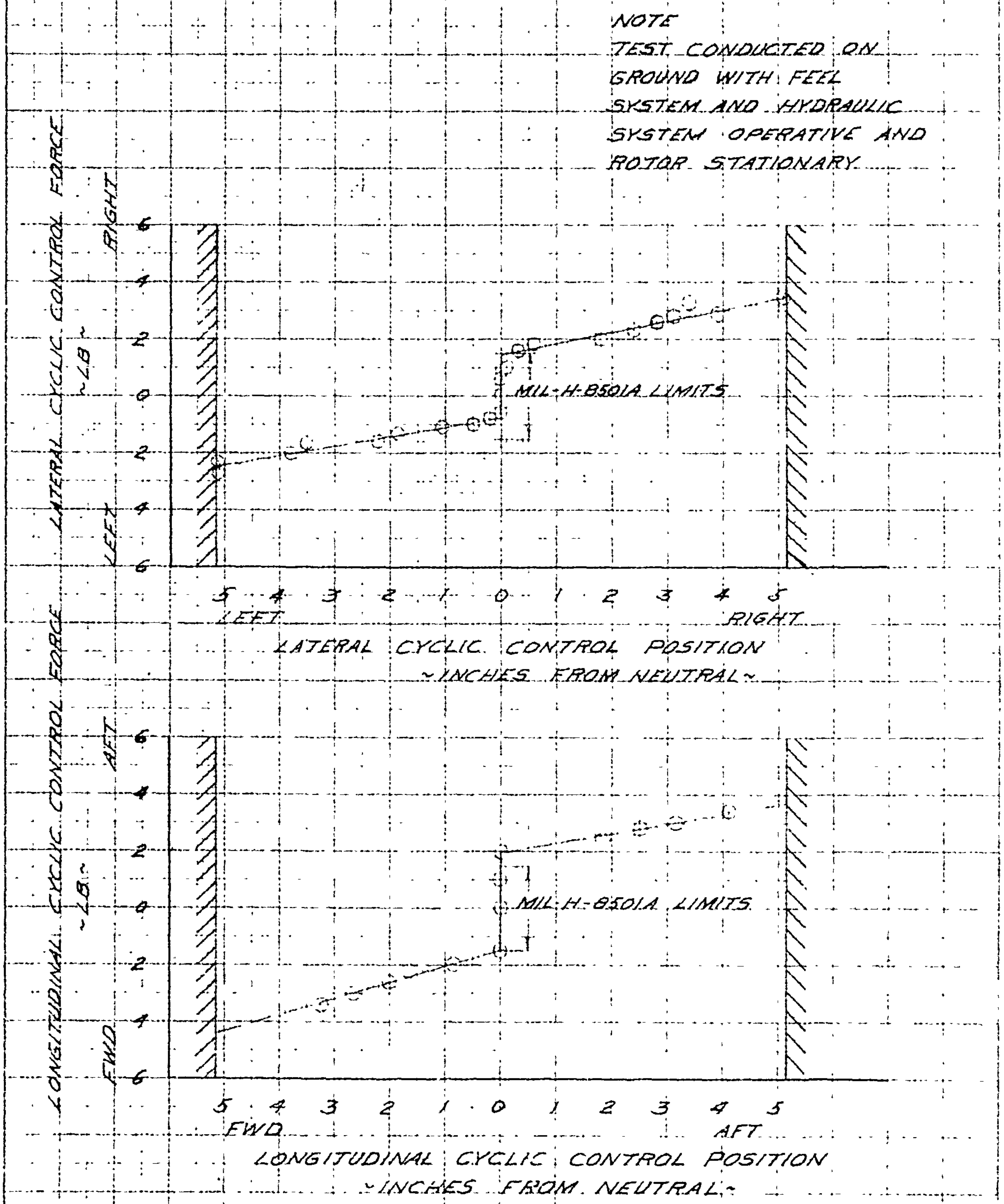


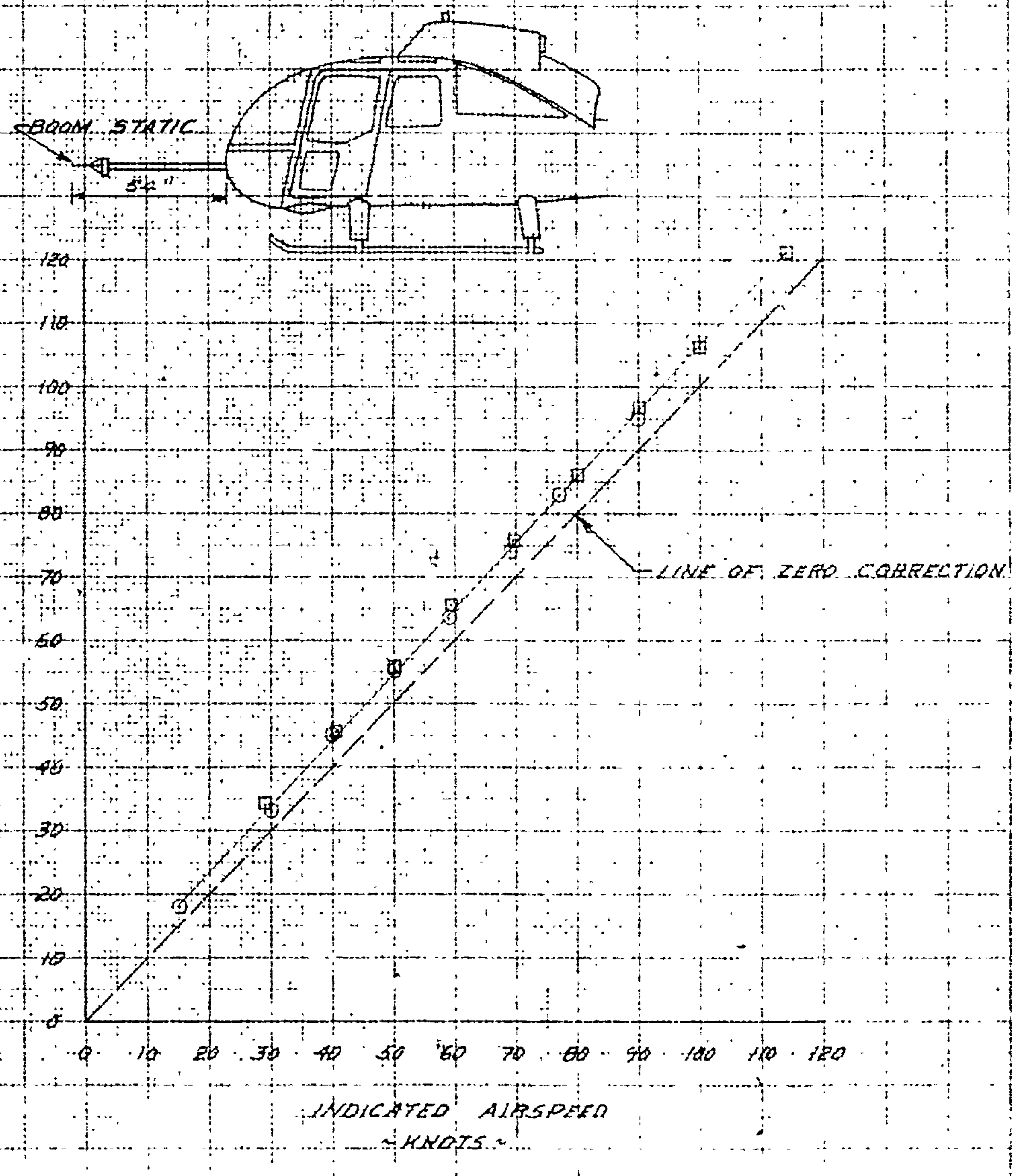
FIGURE NO. 202

AIRSPEED CALIBRATION

OH-5A USA S/N 62-4209 & 62-4210

BOOM TEST SYSTEM

SYM	HELICOPTER	CALIBRATION METHOD
○	62-4209	OH-4A PACER
□	62-4210	OH-6A PACER



APPENDIX II

GENERAL AIRCRAFT INFORMATION

Aircraft Dimensions, Design Data and FAA Type Inspection Authorization Limitations, Weight and Balance and Instrumentation

1. Sources of Information

The following descriptive and design information was obtained from the FAA approved Flight Manual and the limitations were obtained from the FAA Type Inspection Authorization applicable at the t of the tests. The aircraft was flown to these limitati s unless otherwise stated in the body of the report.

2. Description of Aircraft and Systems

2.1 Aircraft Design Data

a. Aircraft Dimensions and Certified Weights

Length (Over-all)	39 feet 9 inches
Height (Over-all)	11 feet 10.3 inches
Width (Tread)	7 feet 2.75 inches
Rotor Diameter	35 feet 5 inches
Empty Weight	1501 pounds
Design Gross Weight	2530 pounds
Overload Gross Weight	3000 pounds

b. Rotor Blade Control Travel

Collective Pitch Travel	11 degrees
Cyclic Pitch - Longitudinal	12 degrees forward 8 degrees aft
- Lateral	6.25 degrees right and left
Tail Rotor Pitch	-4 degrees to + 14.1 degrees

c. Rotor Dimensions and Design Data

Main Rotor Centroid	Station 100.0
Main Rotor Diameter	35 feet 5 inches
Main Rotor Chord (Constant)	10.22 inches
Main Rotor Airfoil	NACA 63_2015
Main Rotor Twist	-10 degrees
Tail Rotor Diameter	72 inches
Tail Rotor Chord 75 percent Radius	4.624 inches
Tail Rotor Twist	None

2.2 Aircraft Systems

2.2.1 Electrical System

A 24 volt, 12 ampere-hour nickel-cadmium battery provided DC power for all electrical services, including engine starting. All electrical circuits are protected by circuit breakers. The DC power was controlled by a master electrical selector switch. Provision is made for an external power receptacle. In flight electrical power is provided by a 28 volt, 100 ampere-hour combined starter-generator. A load meter is provided in the cockpit. The battery can be isolated in flight by moving the master switch from the battery to "generator" only position.

2.2.2 Power Plant

The OH-5A was powered by a T63-A-5 (free turbine) turboshaft engine with a take-off power rating of 275 horsepower at 6000 rpm. The maximum continuous power rating of the engine is 233 horsepower at 6000 rpm.

2.2.3 Landing Gear

A skid landing gear fitted with torsion bar shock absorptive devices is used on the OH-5A. Ground handling wheels permit one man ground handling.

2.2.4 Fuel System

A single rubberized fabric cell having a capacity of 69 gallons is located within the basic body between Stations 80 and 130. The fuel system includes a fuel cell; fuel boost pump; fuel shut-off valve; defueling valve; fuel heater; vent lines; fuel filter, and fuel lines and fittings. Provision is made for adding range extension torso tanks.

2.2.5 Control Systems

The control system consists of conventional cyclic, collective sticks and rudder pedals controlling attitude, vertical and directional changes respectively. A conventional twist-grip gas producer (N_1) throttle is mounted on the collective stick. A "beeper" switch on the collective stick console, operated by the thumb, allows fine trimming (96 - 101 percent) of engine power turbine (N_2) speed. The cyclic and collective control systems consist of push-pull rods, bell-cranks and support brackets from the cockpit to the stationary swash-plate, thence from the rotating swash-plate to the blades. (double-acting irreversible hydraulic power cylinders on the cyclic and collective control systems provide forces required for main rotor control.)

The OH-5A is equipped with a primary and secondary hydraulic system. The primary system supplies boost power to the cyclic and collective, the secondary system supplies boost power to the cyclic only. In the event of a hydraulic pressure failure to the primary system, boost power to the cyclic is still supplied by the secondary system. If the secondary hydraulic system should lose pressure the cyclic and collective will still have boost power from the primary system. There is no provision in the cockpit to turn off the boost power

The OH-5A incorporates a two-axis stability augmentation system (SAS). Pitch and roll motions are sensed by the pilot's panel gyro horizon. The generated signal provides stability by directly sensing pitch and roll angles and rates. The generated signal is amplified to drive the electric motors of the SAS actuators. The actuators are extendable links in the cyclic controls that are capable of moving the swashplate 15 percent of its travel longitudinally and 23 percent laterally. The SAS can be manually turned off by a switch in the cockpit.

3. TIA Limitations

The following limitations were adhered to during the tests:

3.1 Engine and Transmission Limitations

a. Rating

	Take-off (5 min.)	Maximum Continuous
Shaft Horsepower	250	212
Gas Producer rpm	48,950	47,350
Output Shaft rpm	6000	6000
Measured Gas Temperature	1240°F (671°C)	1,165°F (630°C)

NOTE: The above engine ratings are based on static sea level conditions. The maximum allowable torque as measured by the torque meter for below standard inlet air temperature and/or ram conditions is 240 foot pounds (275 HP @ 100 percent N_2) for take-off and 204 (237 HP @ 100 percent N_2) for maximum continuous.

b. Temperature Limits

Measured Gas Temperature

Take-off (5 min.)	1360°F (738°C)
Maximum Continuous	1280°F (693°C)
Maximum Transient (not to exceed 6 seconds)	1550°F (843°C)
Oil Inlet Temperature	-65°F to 200°F

3.2 Airframe and Rotor Limitations

a. Rotor Speed	Maximum	Minimum
Power - On	375	353
Power - Off	410	280

b. Load Factor	2530 Pounds	3000 Pounds
Power - On	3.0	2.95
Power - Off	3.0	2.95

c. Weight and Center of Gravity

Design Weight	2530 pounds
Overload Weight	3000 pounds
Maximum Forward C.G.	Station 95.5
Maximum Aft C.G.	Station 101.5
Maximum Lateral C.G.	±2.5 inches from Centerline

3.3 Airspeed Limitation

a. Forward Flight [Speed in Knots Calibrated Airspeed (KCAS)]

		Airspeed	
2530 pounds	V_{NE}	110	Decrease 4.5 knots/ 1000 feet above 5000 feet
	V_{Dive}	122.5	
3000 pounds	V_{NE}	100	Decrease 4.7 knots/ 1000 feet above 3300 feet to service ceiling
	V_{Dive}	110.5	

b. Sideward and Rearward Flight [Speed in KCAS]

	Sideward	Rearward
2530 pounds	35	35
3000 pounds	35	35

3.4 Sideslip Limitation

Airspeed KCAS	Maximum Sideslip Angle ~ Degrees Right	Left
35	90	90
43.5	30	45
110	20	15

4. Weight and Balance

Aircraft 62-4209 was weighed and balanced in an uninstrumented condition in a closed hangar with an electronic weighing kit. The aircraft contained trapped fuel and full oil. The results of this weighing were as follows:

Gross Weight	1473 pounds
Center-of-gravity	Station 108.53

A typical loading to bring the OH-5A up to the design gross weight of 2530 pounds would include:

Basic Weight	1473 pounds
69 Gallons Fuel @ 6.5 lb/gal	448.5 pounds
Crew of Two	400 pounds
Cargo	205.5 pounds
	2530 pounds

Armament installations (excluding ammunition) that can be installed on the OH-5A and their weights are as follows:

XM-7 (left side)	140 pounds
XM-8 (right side)	142 pounds

During the test program both aircraft (62-4209 and 62-4210) were weighed and the center-of-gravity determined with instrumentation installed. Ballast was added to achieve the following engine start loading conditions:

Aircraft 62-4209 Configuration	Gross Weight ~ Pounds	Longitudinal C.G. ~ Inches	Lateral C.G. ~ Inches
Design GW, aft C.G.	2762	101.5	0.2 left
Design GW, fwd C.G.	2745	95.7	0.2 left
Overload GW, aft C.G.	3046	101.9	0.2 left

Aircraft 62-4210 Configuration	Gross Weight ~ Pounds	Longitudinal C.G. ~ Inches	Lateral C.G. ~ Inches
Design GW, aft C.G.	2766	101.4	0.2 left
Design GW, fwd C.G.	2766	95.7	0.2 left
Overload GW, fwd C.G.	3050	95.7	0.2 left
XM-7, aft C.G.	2766	101.3	1.1 left
XM-8, aft C.G.	2764	101.3	0.3 right

5. Instrumentation

Instrumentation was installed and maintained by personnel from the Logistics Division, U. S. Army Aviation Test Activity.

Similar instrumentation was installed in both the 62-4209 and 62-4210 aircraft.

The following sensitive, calibrated instruments were installed in the cockpit and hand recorded by an engineer observer:

1. boom system airspeed
2. boom system altitude
*3. ship airspeed
4. rotor rpm
5. angle of sideslip
6. fuel consumed counter
7. outside air temperature

The following parameters were recorded on an oscillograph:

1. total longitudinal control input
2. longitudinal cyclic stick position
3. lateral control position
4. pedal position
5. collective pitch position
6. pitch angle
7. roll angle
8. yaw angle
9. angle of sideslip
10. angle of attack
11. pitch rate
12. roll rate

13. yaw rate

14. C.G. normal acceleration

15. voltage monitor

* Installed only on 62-4209

APPENDIX III

SYMBOLS AND ABBREVIATIONS

Symbol	Definition	Units
KIAS	knots indicated airspeed	kts
KTAS	knots true airspeed	kts
Vmax	maximum attainable airspeed	kts
Vne	never exceed airspeed	kts
Vmin R/D	airspeed for minimum rate of descent	kts
Vmax R/C	airspeed for maximum rate of climb	kts
Vmin Angle/Descent	speed for minimum angle of descent	kts
Vdive	maximum permissible diving airspeed NOTE: normally demonstrated by contractor	kts
R/D	rate of descent	ft/min
R/C	rate of climb	ft/min
RPM	revolutions per minute	rpm
IGE	in-ground effect	-
OGE	out-of-ground effect	-
C.G.	center of gravity	in.
N_1	compressor speed	rpm
N_2	power turbine speed	rpm
H_D	density altitude	ft
°F	degrees Fahrenheit	deg
°C	degrees centigrade	deg